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**BIOLOGICAL SPECIES ANALYSIS  
BOULDER RESERVOIR  
BOULDER COUNTY, COLORADO**

*Prepared for—*

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**BIOLOGICAL SPECIES ANALYSIS  
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BOULDER COUNTY, COLORADO**

**FEBRUARY 2013**

**Introduction**

Boulder Reservoir is a multiuse recreation and water storage facility (facility) owned and managed by the City of Boulder (Boulder) and operated for domestic water supply and irrigation by the Northern Colorado Water Conservancy District (District). The Boulder Reservoir study area is 1,190 acres, including the large 560-acre reservoir and the smaller Coot Lake in the northeast corner. Boulder Reservoir has historically provided, and continues to provide, habitat for prairie wildlife species. Prior to construction of the reservoir, the area consisted of grasslands and rangelands. The native grasslands were characterized by shortgrass species such as blue grama in drier upland areas with drainages and streams providing more moist conditions supporting wetlands, riparian areas, and mid- to tallgrass species such as big bluestem and western wheatgrass. Construction and filling of the reservoir in 1955 altered the general ecology of the area, converting large areas of shortgrass prairie to a large body of open water surrounded by narrow bands of shoreline and wooded riparian communities that support a diverse variety of waterfowl and shorebirds during summer breeding season, winter, and migration. The wetlands and grasslands surrounding the reservoir also support rodents, mammalian and avian predators, and numerous bird species of special concern as identified by Boulder County Nature Association (BCNA) in cooperation with Boulder County Parks and Open Space (Hallock and Jones 1999).

The completion of the reservoir also expanded opportunities for water-based human recreation. Over the years, the Boulder Reservoir has experienced increased recreation use with more than 300,000 visitors per year and the construction of numerous recreation facilities by the Boulder Parks and Recreation Department (Department). The recreation amenities include boating facilities, a marina, a swim beach, picnic facilities, and numerous trails.

The Department is currently developing the Boulder Reservoir Master Plan (BRMP; Boulder 2012a). The purpose of the BRMP is to establish a long-range vision, goals, and objectives for Department-managed land and activities for Boulder Reservoir and Coot Lake. The intent is to guide future management and investment strategies by integrating the principles of economic, social, and environmental sustainability, including recommendations addressing water quality, natural habitat, and recreational uses at Boulder Reservoir. The Department contracted with ERO Resources Corporation (ERO) to collect existing biological information and work with the Department to develop the biological resource data needed for the public involvement phase of the planning process. ERO's analysis focuses on research and synthesis of existing biological data from the Department and other relevant sources to illustrate the past and present ecological conditions of Boulder Reservoir (see Appendix A for detailed study methods). The objectives of this study are to:

1. Generally describe, through graphics and text, historic vegetation and wildlife communities based on available information.
2. Provide maps and written descriptions of current conditions of vegetation and wildlife communities based on existing information.
3. Present a cohesive narrative of vegetation and wildlife resources that sets the stage for future decision making.

### **Biological Setting**

The physical environment of Colorado has a diverse array of topography and landforms that in turn influences our unpredictable climatic patterns of temperature and precipitation. The combination of landforms and climate determines the types and distribution of vegetation, and subsequently influences the types and distribution of animals on the landscape.

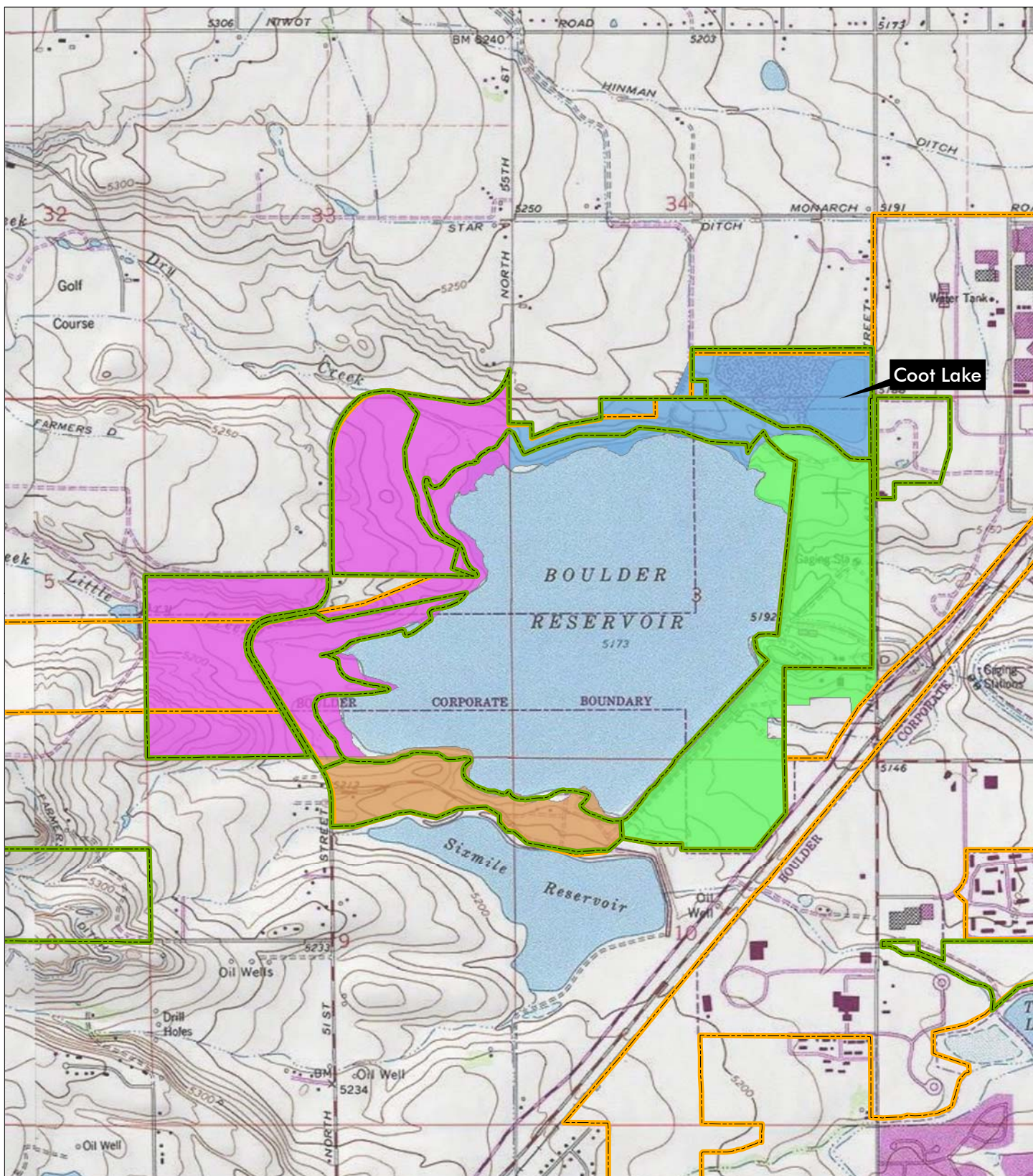
Biological resources can be evaluated at several levels: as a species, a group of species sharing similar characteristics (e.g., birds of prey or raptors and waterfowl), a community, or a functional component of the ecosystem. For purposes of this report, ERO describes the biological resources of Boulder Reservoir and the surrounding area in terms of five landforms and vegetation types based on the following ecological communities:

- **Open water and shorelines** – Includes the waters of the reservoir and Coot Lake and their surrounding shorelines below the high water level.
- **Herbaceous wetlands** – Herbaceous wetlands are areas where water saturates the soil long enough to support wetland grasses and other nonwoody vegetation (U.S. Army Corps of Engineers (Corps) 2010). Herbaceous wetlands occur along the tributaries that flow into the reservoir, along ditches, and on the west side of Coot Lake.
- **Wooded riparian** – Wooded riparian areas contain trees and shrubs supported by aboveground and belowground streamflows, in addition to annual precipitation. Cottonwoods, peachleaf willows, and other trees dominate the wooded riparian areas within Boulder Reservoir. Sandbar willow shrubs are also common. Wooded riparian is most prevalent along the west end of Boulder Reservoir where tributaries flow into the reservoir, although narrow bands occur around the remainder of the shoreline. Wooded riparian vegetation also surrounds Coot Lake.
- **Shortgrass prairie** – Shortgrass prairie occurs in the uplands around the reservoir. The dominant species largely depends on the previous management practices. Nonnative grasses, such as smooth brome, occur in areas previously planted for hay production or reclaimed disturbed areas. In relatively undisturbed areas, native shortgrass species such as blue grama dominate, although invasive species are common.
- **Disturbed/urban parkland** – This classification includes areas permanently altered for construction and maintenance of the dam, reservoir, and water facilities; other buildings and structures; roads; parking lots; and active recreation facilities. For example, the South Shore of the reservoir that is intensely used for park activities has been landscaped with turf grasses and is classified as disturbed/urban parkland.

These communities are similar to the vegetation communities identified in the BMRP (Boulder 2012a), except that the high-functioning wetlands described in the BMRP have been divided in this report into open water and shorelines, herbaceous wetlands, and wooded riparian.

Brief descriptions of biological resources, including biology, distribution over time, and susceptibility to changing conditions, are provided below by community type. Biological resources of high-priority conservation targets have also been identified.

Boulder Reservoir is divided into the following four management units (Figure 1):



## Boulder Reservoir Biological Species Analysis

- |   |  |
|---|--|
| <span style="display: inline-block; width: 20px; height: 10px; background-color: lightblue; border: 1px solid black;"></span> North Shore and Coot Lake | <span style="display: inline-block; width: 20px; height: 10px; border: 2px solid green;"></span> Park Boundary |
| <span style="display: inline-block; width: 20px; height: 10px; background-color: lightgreen; border: 1px solid black;"></span> North and South Dam      | <span style="display: inline-block; width: 20px; height: 10px; border: 2px dashed orange;"></span> City Limits |
| <span style="display: inline-block; width: 20px; height: 10px; background-color: orange; border: 1px solid black;"></span> South Shore                  |  |
| <span style="display: inline-block; width: 20px; height: 10px; background-color: pink; border: 1px solid black;"></span> West Shore                     |  |

Sources: City of Boulder; City of Boulder Parks and Recreation

0 1,000 2,000  
Feet



**Figure 1**  
**Boulder Reservoir Site Location and Management Areas**

Prepared for: City of Boulder Parks and Recreation  
File: 5200 fig 1 bldr res site & mgmnt locs.mxd (WH)  
December 2012

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- North Shore, including Coot Lake
- North and South Dam
- South Shore
- West Shore

Each of these management units contains one or more of the communities described above as presented in Table 1.

**Table 1. Most prevalent vegetation communities within management units at Boulder Reservoir.**

Vegetation Communities	Management Units			
	North Shore	North and South Dam	South Shore	West Shore
Open Water and Shorelines	X	X	X	X
Herbaceous Wetlands	X	(minor)		X
Wooded Riparian	X	X		
Shortgrass Prairie	X	X		X
Disturbed/Urban Parkland		X	X	

## Biological Resources

The following sections describe the historical and existing conditions of biological resources at Boulder Reservoir and the desired future conditions to protect and maintain those high value resources and enhance or restore degraded resources and to healthy diverse communities.

### Open Water and Shorelines

Water levels at the Boulder Reservoir have fluctuated greatly since filling of the reservoir began in 1955, depending on the amount of water storage needed and periodic climatic fluctuations. This fluctuation contributes to the vegetation communities that have developed surrounding the reservoir and the wildlife communities associated with these communities. Additionally, Coot Lake was originally excavated as a borrow pit to provide materials for the dam construction and since then has filled with water (Design Studios West Inc. 1983). Wave action on Coot Lake eventually resulted in severely eroded shorelines and degraded wildlife habitat, particularly along the south and east

shores. Boulder initiated a project in 2000 to stabilize banks and shorelines using logs, boulders, and native vegetation (Professional Wetlands Consulting, Inc. 1999).

### ***Vegetation Resources***

Within the permanent waters of the reservoir, patches of pondweed and other submergent vegetation occurs amidst the unconsolidated pond bottoms. Along the shoreline, little vegetation grows except for annuals and seedlings of cottonwoods and willows (Photo a). This vegetation may persist for several years during dry periods but would disappear when water levels rise. This pattern of sparse permanent vegetation along the shoreline is likely to continue because of varying water storage needs.

**Photo a. Open water and bare shoreline of the reservoir.**



The North Shore of the reservoir is eroding due to wave action, fluctuating water levels, and human trampling (Photo b). This erosion has caused the loss of cottonwood trees and other vegetation.

**Photo b. Eroding North Shore of the reservoir.**



Currently Coot Lake contains a mixture of submergent vegetation and open water, similar to the reservoir waters. In contrast to the reservoir, Coot Lake's shores are mostly vegetated to the edge of the annual high water level with little unvegetated shoreline except at established walking paths (Photo c).

**Photo c. Coot Lake shoreline.**



### ***Wildlife Resources***

Open water and shoreline habitats support numerous summer foraging areas for waterbirds such as ducks, geese, and seagulls; wading/shorebirds such as herons; and

fish-eating birds of prey (raptors) such as ospreys and bald eagles. Water levels and the amount of shoreline exposed at the reservoir fluctuates depending on water supply needs and reservoir operations, but shoreline habitat is generally available year-round. The shoreline provides potentially suitable nesting habitat for shorebirds such as killdeer, and spring and fall migration stopover and foraging areas for migrant sandpipers.

Water levels and open water/shoreline habitats are more stable at Coot Lake, supporting much more stable herbaceous wetland and wooded riparian communities, as discussed below. A growing management concern of lakes and reservoirs in Colorado is the threat of Aquatic Nuisance Species (ANS) due to their potential to spread rapidly and their adverse ecological and economic impacts. ANS are addressed in the *Biological Resources of High-Priority Conservation Targets* section below.

#### ***Desired Future Conditions***

The open waters and submergent vegetation within the reservoir and Coot Lake are functioning at a sustainable level. However, the quality of these areas would decrease significantly if Eurasian watermilfoil or ANS invades the area. It is critical for the protection of water supplies within the reservoir and important to the overall health of both the reservoir and Coot Lake that these infestations be prevented as required by the State of Colorado and as described below under *Aquatic Nuisance Species*.

No changes to the unvegetated shoreline of the reservoir are anticipated as the lake levels will continue to vary depending on the District's water needs. However, the North Shore is eroding and encroaching on existing vegetation. At Coot Lake, the 2000 shoreline stabilization project temporarily stabilized the shoreline, although wave action continues to erode sections of the bank. Monitoring and continued maintenance of the shoreline will be required to prevent further erosion. Restoration should be considered for some of these areas as described in the *Recommendations* section.

The desired future condition for wildlife communities using open water and shorelines would be to maintain or increase protections of the West Shore and Coot Lake, particularly as human activities increase. A major threat to waterbirds and shorebirds using open water and shoreline habitats at Boulder Reservoir is human disturbance and displacement from foraging and nesting areas by human activities including boating,

hiking along the shore, and off-leash dog activity. Boating is seasonally restricted along the West Shore of the reservoir and a recently installed fence separating the North Shore from the West Shore management areas provides a physical barrier to human encroachment. Fencing also limits human disturbance to the west shore of Coot Lake. Based on vegetation characteristics, it appears the fence is deterring some human encroachment, but barriers and restrictions are dependent on enforcement and compliance with Department rules.

### **Herbaceous Wetlands**

Herbaceous wetlands (wetlands dominated by sedges, forbs, and grasses with few trees or shrubs) in Boulder County have been manipulated since gold mining days in the 1850s when pioneer farmers diverted creeks to water agricultural fields. Creation of ditches and water storage reservoirs to support agriculture and increased urban development has continued through recent times, including construction of Boulder Reservoir in 1954 (Design Studios West Inc. 1983). Since 1976, wetlands throughout the region have been lost due to construction of subdivisions and gravel mines (National Wetland Inventory (NWI) 2012; Google Earth 2012) (Figure 2). Some of these lost wetlands were replaced as required under the Clean Water Act of 1972.

The manipulation of wetlands since gold mining days has resulted in fewer wetlands within the riparian areas around natural streams and more human-created wetlands along ditches and reservoirs on the Plains. A study conducted in 1988 found that although the amount of wetlands in the City of Boulder may not have changed significantly from presettlement to recent times, the type and function of wetlands have changed with about one-half of the wetlands now formed by human activity (Boulder 1988). This loss of about one-half of the natural wetlands in Boulder was caused by channelization of streams and prevention of annual spring overflows supporting floodplain wetlands (Figure 3). The functions of the human-created wetlands are very different from natural wetlands. The loss of natural wetlands has resulted in the loss of important wetland functions such as general wildlife habitat (except for waterfowl), water quality functions – nutrient retention and sediment trapping, food chain support, and shoreline

**Figure 2. Changes in the Type and Functions of Wetlands in Boulder County**

**1850s**

Most of wetlands in Boulder County were associated with streams



**Present**

Only half of today’s wetlands are associated with streams (riparian) and many of the remaining wetlands have diminished functions



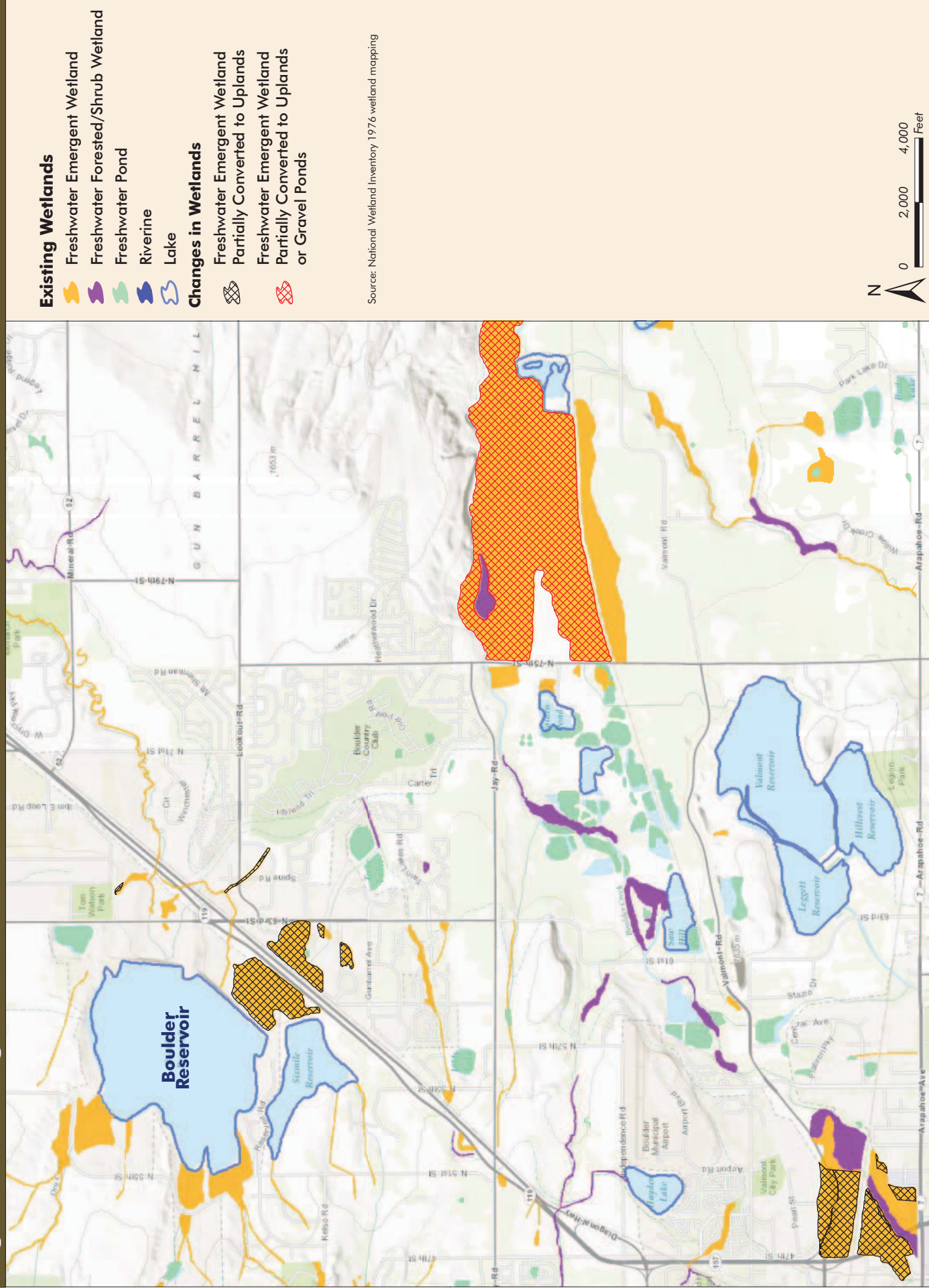
Half of current wetlands are associated with man-made ditches and ponds



**Wetland Functions**

Riparian Wetland	Pond/Ditch Wetland	Gravel Pond Wetland
May be high functioning (depending on the amount of disturbance) <ul style="list-style-type: none"><li>• Wildlife habitat</li><li>• Sediment trapping</li><li>• Food chain support</li><li>• Shoreline anchoring</li></ul>	Medium to low functions <ul style="list-style-type: none"><li>• Flood storage</li><li>• Wildlife habitat</li></ul>	Medium to low functions except <ul style="list-style-type: none"><li>• Flood storage - High</li><li>• Fish habitat - High</li></ul>

Figure 3. Changes in Wetlands in the Boulder Area from 1976 to Present



anchoring. These functions generally are not being replaced by human-created wetlands (Boulder 1988).

### ***Vegetation Resources***

Wetlands along Little Dry Creek provide a good illustration for describing the complex history of wetlands within the Boulder Reservoir boundaries. Before 1937, there were wide wetlands across the Little Dry Creek Valley. These wetlands were drained in about 1937 to increase agricultural productivity on the land. After the reservoir was built, a combination of cattail and sedge/rush wetlands reestablished (Camp Dresser & McKee (CDM) 1986). The amount of wetlands at Little Dry Creek were increased by Boulder from construction of 12 acres of cattail wetlands to replace wetlands lost by the expansion of the reservoir (ESCO Associates Inc. 1986). Over time, the wetlands have greatly expanded beyond the original mitigation area (Photo d).

#### **Photo d. Little Dry Creek wetlands that have expanded over time.**



Herbaceous wetlands occur along the tributaries that flow into the reservoir and on the west side of Coot Lake. The most extensive herbaceous wetlands occur along Little Dry Creek and Dry Creek within the West Shore management area. Cattails, sedges, and rushes dominate these wetlands surrounded by tallgrass species such as prairie cordgrass and big bluestem. Nonnative species, including noxious weeds, are also common.

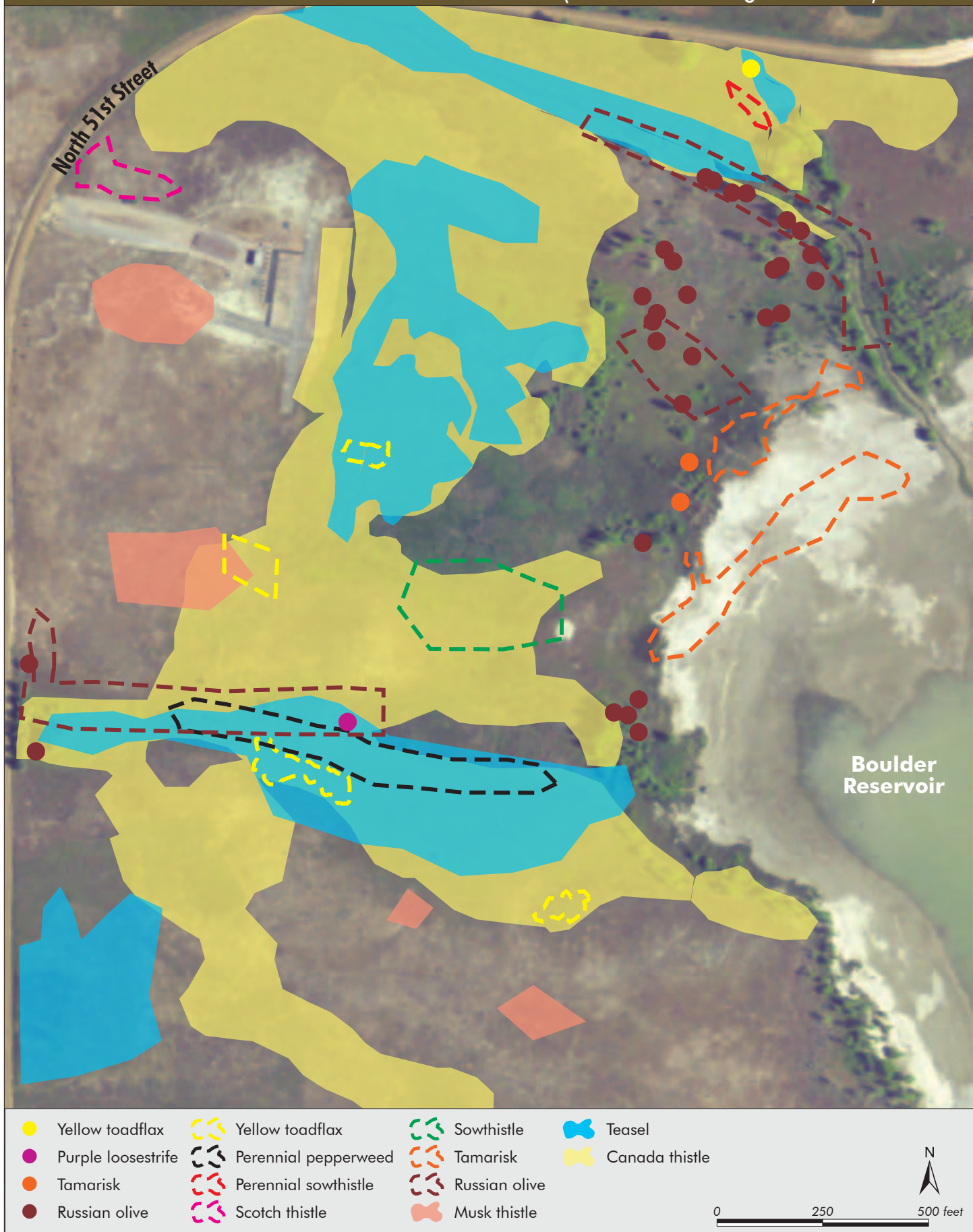
The wetlands along Dry Creek and Little Dry Creek, including the reservoir, rate high in functions such as flood storage, sediment trapping, nutrient retention, and wildlife habitat (both terrestrial and aquatic) (Boulder 1988). One concern within these wetlands is the high amount of noxious weeds (Figure 4), which are currently being treated by Department staff.

Extensive wetlands were constructed to the west of Coot Lake as part of a mitigation effort (Professional Wetlands Consulting, Inc. 1999). Currently, the Coot Lake western wetlands are a complex mosaic of open water lined with sedges, other wetland graminoids (grasses), and wooded riparian vegetation (Photo e). Patches of native tallgrass species including switchgrass form patches on the upper banks, especially along the south shore of Coot Lake. Purple loosestrife, a noxious weed that the state requires to be eradicated, infests this wetland. Boulder Reservoir staff are actively treating this and other noxious weeds within the Coot Lake western wetlands (Boulder 2012b). Coot Lake is rated as very high for four wetland functions (fish habitat, wildlife habitat, active recreation, and passive recreation) and as high for four additional wetland functions (shoreline anchor, nutrient retention (short-term and long-term), and basic food chain support) (Boulder 2012a, 2012c). The wetland restoration efforts have been successful in creating extensive wetlands to the west and stabilizing the shoreline; however, wave action continues to erode the East and South shores of Coot Lake and small islands constructed to protect the South Shore are greatly reduced in size and effectiveness.

**Photo e. Herbaceous wetlands at the western edge of Coot Lake.**



**Figure 4. Example of Noxious Weed Control Efforts – 2011**  
Northwestern End Reservoir Area Weeds (West Shore Management Area)



Source: City of Boulder Parks and Recreation Department. Integrated Pest Management and Conservation Crew, 2011 Summary of Crew Activities

### ***Wildlife Resources***

Wetlands provide essential resources for numerous wildlife species, including food sources, water, and cover for breeding or hiding from predators. Combined with wooded riparian communities, wetland/riparian areas are some of the most diverse and productive wildlife habitats, particularly in the arid West. Many wildlife species are considered wetland dependent or wetland obligate species (depend on wetlands for some portion or the entire annual life cycle, respectively). Wildlife species using herbaceous wetlands at Boulder Reservoir include muskrat, frogs and toads, red-winged blackbird, Wilson's snipe, sora, and Virginia rail.

The wetlands at Boulder Reservoir also support several Boulder County bird species of special concern. The prominent species include American bitterns, northern harriers, and savannah sparrows that have nested west of Coot Lake and in wetlands along Dry Creek and Little Dry Creek, west of the reservoir (Hallock and Jones 1999; Jones 1993, Jones 2012). Another species of special concern, the short-eared owl, is frequently observed wintering at Boulder Reservoir (Jones and Mahoney 2010; Hallock and Jones 2011). These and other species are discussed in more detail in the *Biological Resources of High-Priority Conservation Targets* section.

In addition to the species of concern described above that are monitored on an annual basis, and some opportunistic observations, little specific or consistently collected information on wildlife species occurring in herbaceous wetlands at Boulder Reservoir currently exists.

### ***Desired Future Conditions***

The herbaceous wetlands along Little Dry Creek, Dry Creek, and the west end of Coot Lake are currently functioning at a high level and impacts on these wetlands should be avoided wherever possible to prevent the degradation of these wetlands. Maintenance of these high-functioning wetlands will require continued management and control of noxious weeds per the State of Colorado requirements (Colorado Department of Agriculture (CDOA) 2012) and the BRMP (Boulder 2012a).

Data on wildlife species are currently lacking and breeding bird and small mammal inventories would assist the Department in managing and monitoring these high-

functioning wetland communities. Continued seasonal restrictions and increased enforcement of restrictions within sensitive herbaceous wetlands, particularly west of Coot Lake and along Little Dry Creek and Dry Creek, are recommended.

Recommendations and minimization measures to protect herbaceous wetlands are provided in the *Recommendations* section.

### **Wooded Riparian**

Before construction of the reservoir, there was probably little or no woody vegetation within the area except for narrow bands along the streams. Since inundation of the reservoir, woody vegetation has established along the tributaries to Dry Creek and Little Dry Creek, around Coot Lake, and in scattered pockets along the North Shore and other shorelines around the reservoir. The establishment and expansion of these tree and shrub stands create wildlife habitat that was not present before construction of the reservoir. Depending on the specific history of each area, these stands occur in various sizes and state of health.

### ***Vegetation Resources***

At the West Shore of the reservoir, mixed stands of native trees, such as plains cottonwood and peachleaf willow, and the noxious weed tamarisk grow where Little Dry Creek flows into the reservoir (Design Studios West Inc. 1983). Large stands of trees and shrubs also have established in other areas such as on the South Shore (Bing Maps 2012). Along Dry Creek to the north, older established trees are adjacent to herbaceous wetlands with juvenile trees (between 20 and 40 feet tall) occurring closer to the current shoreline (Photo f).

**Photo f. Wooded riparian vegetation along Dry Creek.**



Human activities and wave action has degraded the wooded riparian vegetation on the North Shore and this community is generally lower quality than riparian vegetation along the creeks (Photo b and Photo f). The North Shore of the reservoir consists of an eroding shelf covered with narrow bands of mostly plains cottonwood and peachleaf willow trees between 20 and 40 feet high. In many areas, a vegetation understory is absent, resulting in extensive bare areas caused by foot traffic and other activities (Photo g). The absence of any shrub or herbaceous layer provides very limited cover or breeding habitat for wildlife. In other areas, the understory is more vegetated and includes patches of shrubs dominated by sandbar willow and a variety of grasses ranging from native western wheatgrass to nonnative reed canarygrass, and noxious weeds such as diffuse knapweed and Russian olive. The plains cottonwoods along the North Shore mostly occur in stands ranging from sapling trees less than 20 feet tall to even-aged trees 20 to 40 feet tall. Little regeneration of riparian trees is currently occurring. No seedlings were noted and only a few young trees, 1 to 5 feet tall, were found scattered along the North Shore. Although the bare, moist soils within portions of the North Shore would provide an excellent growth medium for the germination of cottonwoods, either the fluctuating water levels, which can drown the seedlings, or trampling has likely prevented the establishment of seedlings.

**Photo g. Degraded understory of North Shore wooded riparian.**



The North Shore is included as part of the reservoir wetlands, which is classified as high functioning by the City of Boulder (Boulder 2012b) because of the large flood storage capacity and the high-quality wetlands along Little Dry Creek and Dry Creek. However, the wetlands along the North Shore are not of similar quality as the other reservoir wetlands. If analyzed separately, the wetland functions of the North Shore would be lower because the eroding banks do not provide adequate bank stabilization, and the lack of ground cover and shrubs does not provide food chain support or diverse, high-quality habitat consisting of the multiple vegetation layers.

At Coot Lake, wooded riparian vegetation rings the lake and forms a complex mosaic with the herbaceous wetlands at the west end of the lake. Native cottonwoods and peachleaf willows are intermixed with nonnative trees, especially Russian olives, that grow in patches on the western end of the lake (Photo h). Underneath the trees are patches of sandbar willow shrubs, nonnative pasture grasses, and native tallgrass species including switchgrass.

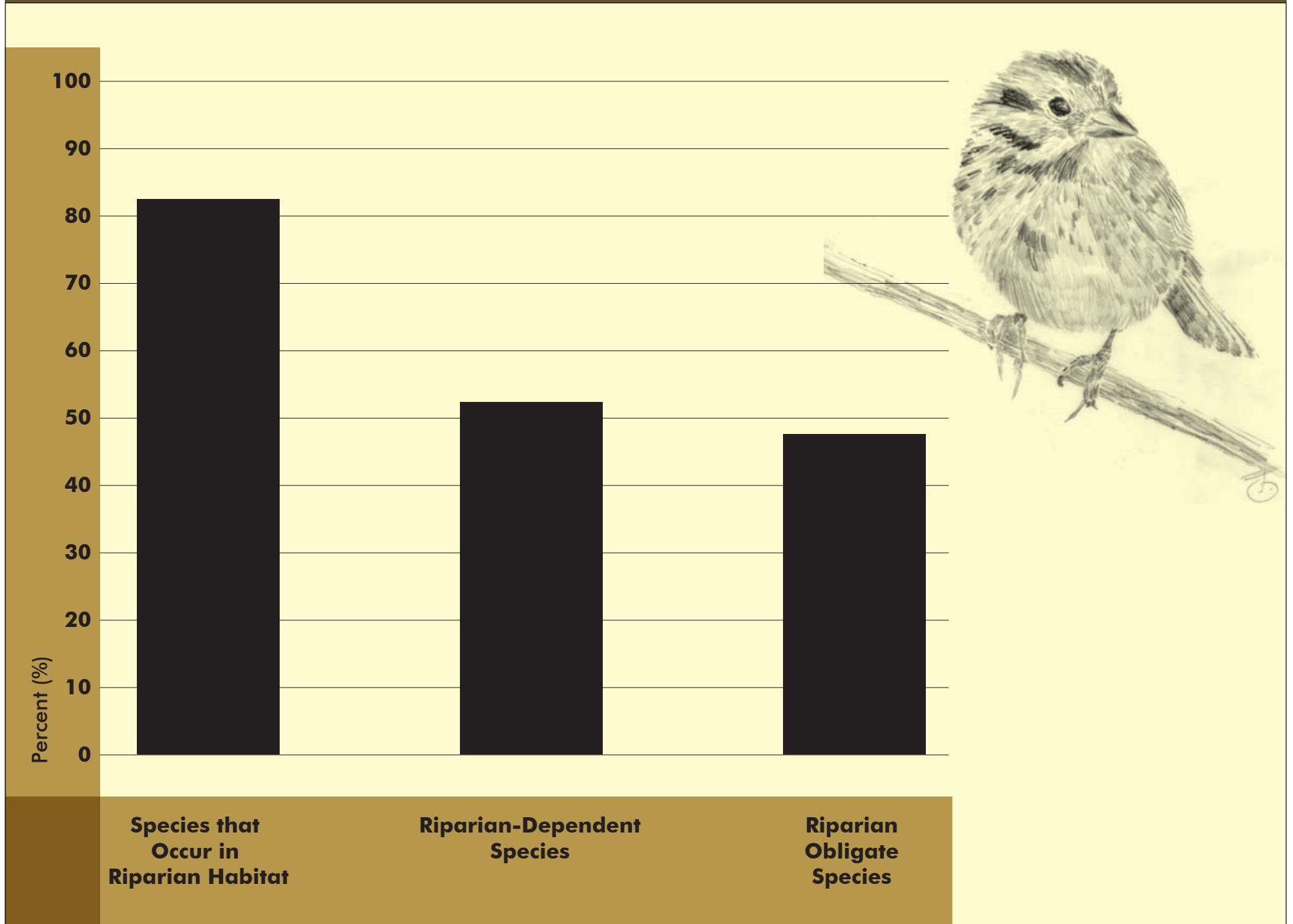
**Photo h. Wooded riparian and herbaceous wetlands at the western end of Coot Lake.**



### ***Wildlife Resources***

Riparian areas are integral in providing the transition between aquatic and terrestrial elements of the ecosystem. Riparian ecosystems typically support many more species of native birds than surrounding grassland or shrubland communities (Knopf and Samson 1994) (Figure 5). Native riparian ecosystems, especially in the arid Southwest, are disappearing rapidly (Ohmart et al. 1977). A healthy multistructured riparian area provides diverse cover and foraging habitat for insects, invertebrates, and herbivores that in turn provides prey to a complex system of birds, mammals, and higher-level predators. A healthy multistoried riparian area generally has three to four structural layers – a herbaceous understory, a shrub/small tree understory, a mid-story layer, and a mature canopy. The structural diversity in wooded riparian areas provides nest sites for raptors and many songbirds that depend on riparian areas for either a portion (riparian dependent) or all (riparian obligate) of their life cycle. Although not considered Boulder County sensitive species, several songbirds that occur, or potentially occur, within wooded riparian communities at Boulder Reservoir can indicate structural diversity and riparian health. The song sparrow is a widespread riparian obligate that almost

**Figure 5. Bird Species and Riparian Habitats in the Western U.S.** (Knopf and Samson 1994)



exclusively uses understory vegetation. The yellow-breasted chat is a widespread riparian obligate most often found in the understory and mid-story. The yellow warbler and Bullock's oriole are widespread riparian species most often found in mid-story and canopy vegetation. The warbling vireo is a widespread riparian-dependent species found almost exclusively in canopy vegetation (Bureau of Land Management undated).

### ***Desired Future Conditions***

The desired future conditions for wooded riparian communities are healthy multistructured riparian areas consisting of a diverse species composition of trees and shrubs within multiage stands and/or a mosaic of stands of differing ages. A healthy riparian woodland with diverse species and structures provides excellent habitat for a variety of birds and other animals that would not otherwise be found in the area.

The wooded riparian stands at the West Shore and around Coot Lake are of good to excellent quality except for the infestation of Russian olives and other weeds, which are currently being partially treated. Further control of noxious weeds would increase the quality of this habitat type.

Some of the bands of cottonwoods along the North Shore contain trees more than 20 feet tall that provide wildlife habitat for numerous bird species. It is likely these stands would become increasingly valuable over time as the trees grow and the community matures, providing additional riparian structure and riparian habitat for riparian-dependent bird species and potential nesting sites for raptors. The desired future conditions would involve protection and enhancement of herbaceous and shrub understory within wooded riparian stands on the North Shore.

One concern for wooded riparian communities is that new stands may not establish because of the lack of bare, moist soil conditions required for the germination and establishment of cottonwoods and willows. Cottonwood regeneration is a vital component of reestablishing a long-term healthy riparian ecosystem at Boulder Reservoir. Native plains riparian trees – cottonwoods and peachleaf willows – are fairly short-lived species (less than a 150-year life span). Both of these species germinate after spring runoff and seasonal flood events have scoured the banks of streams, creating bare, moist soils that are optimal for tree germination and growth. These bare, moist soil

conditions are becoming increasingly rare in Colorado because of dam building, stream channelization, and other human alterations of native stream systems. Some bare, moist soil conditions exist at the reservoir because of fluctuations in water levels, resulting in the establishment of different age-class stands around the reservoir. Conversely, frequent changes in water levels discourage the establishment of cottonwoods below the high water mark because sustained high-water levels will drown seedlings that have germinated during previous periods of low-water levels.

At Coot Lake, a native riparian community has established along the shores consisting of cottonwoods and sandbar willows with an understory of sedges, rushes, tallgrass species, and other native vegetation along the shore. This healthy assemblage of native species is vulnerable to human activities such as trampling, removing vegetation, and introducing noxious weeds and other invasive species including reed canarygrass. Surveying for invasive species and monitoring changes in the amount and distribution of these species over time within wooded riparian areas would assist the Department in protecting and managing this community. Recommendations and minimization measures to protect wooded riparian areas are provided in the *Recommendations* section.

### **Shortgrass Prairie**

Before settlement, the northern Great Plains was a vast prairie covered by blue grama and other grasses. During the last century and a half, farmers converted the prairie to agricultural lands. Only 15 percent of Boulder County remained grasslands in 1975 (Soil Conservation Service 1975), with some of the native grasslands converted to pasturelands dominated by introduced species. In 1983, the grasslands were dominated by blue grama and buffalograss, sometimes with wheatgrasses and bluegrasses (Design Studios West Inc. 1983).

The shortgrass prairie of Colorado once supported vast migrating herds of bison, pronghorn, and the carnivores that trailed the herds, specifically wolves. These large mammal species are gone, but the grasslands of eastern Boulder County and Boulder Reservoir currently provides habitat for many of the wildlife species such as prairie dog, coyote, cottontail rabbit, and badger, typically found within shortgrass prairie communities of modern-day Colorado.

### ***Vegetation Resources***

Currently, the shortgrass prairie at Boulder Reservoir is a patchwork of native vegetation such as blue grama, buffalograss, and yucca interspersed with areas that were likely irrigated that now contain smooth brome and other introduced and invasive species. Noxious weeds such as diffuse knapweed have invaded many areas of Boulder Reservoir, particularly along trails and other heavily trafficked areas.

### ***Wildlife Resources***

Historically, the native shortgrass landscape was a series of habitat patches created by grazing animals and ranged from extensive disturbance to areas of infrequent or no grazing (Samson and Knopf 1996). As such, shortgrass prairie bird communities generally require a mosaic of grass heights, from very short grass with a high percentage of bare ground to taller grass with more structure, including some shrubs. Thus, active prairie dog colonies create important habitat for several species of grassland birds.

The black-tailed prairie dog once ranged over vast areas of the Great Plains, including eastern Boulder County. Currently in Colorado, the prairie dog is paradoxically classified both as a “destructive rodent pest” by the CDOA (see Colorado Revised Statute (C.R.S.) § 33-7-203), and small game and a species of concern by the Colorado Parks and Wildlife (CPW) (C.R.S. § 33-1-102). Settlement of the West depleted prairie dog populations through conversion of habitat for agriculture and development, introduction of disease, and active control. During the late 1970s and early 1980s, prairie dog colonies appeared to expand in many areas of Boulder County as open space programs expanded and private developers acquired agricultural lands on the periphery of expanding urban centers (Geitzen et al. 1996).

Black-tailed prairie dogs are important ecosystem components of prairie grasslands and are often considered a keystone species (a species that has a disproportionately large effect on its environment and plays a critical role in maintaining the structure of an ecological community, affecting many other organisms). Animals such as the cottontail rabbit, burrowing owl, prairie rattlesnake, amphibians, and numerous insects are closely linked to prairie dog burrow systems in Boulder County for food and/or cover. Prairie dogs also provide an important prey resource for numerous predators at Boulder

Reservoir including American badger, coyote, bald eagle, golden eagle, ferruginous hawk, and other raptors (Jones 1993; Geitzen et al. 1996). More information on black-tailed prairie dog is provided in the *Biological Resources of High-Priority Conservation Targets* section below.

The shortgrass prairie at and surrounding Boulder Reservoir provides suitable nesting substrate (large trees); abundant perches (trees, shrubs, and structures); and prey resources (small mammals, prairie dogs, and birds) to support some of the highest density and diversity of summer and winter raptors in Boulder County (CDM 1986; Jones 1993; Geitzen et al. 1996).

Shortgrass prairie also provides habitat for grassland-dependent bird species. Grassland bird species identified on territories at Boulder Reservoir include western meadowlark, vesper sparrow, and grasshopper sparrow (Jones 1993). Western meadowlarks are common in Boulder County, whereas grasshopper sparrows are more common further east and vesper sparrows are more common in mid- and upper-elevation grasslands (Kingery 1998).

### ***Desired Future Conditions***

The desired future conditions of the shortgrass prairie would be to protect existing areas of native grass communities and restore degraded areas or areas dominated by nonnative species or noxious weeds. Extensive human activities within native shortgrass prairie areas should be avoided as much as practicable because it is difficult to restore this plant community, especially some of the slow-growing species. Restoration should include a mosaic of species and vegetation height to provide diverse habitats for grassland birds and mammals. Prairie dog colonies should contain mostly native vegetation and the density and revegetation of areas dominated by invasive species would benefit the community as a whole. Revegetation of active prairie dog colonies is challenging at best and priority should be placed on areas that have been decimated by plague and not yet repopulated.

Noxious weeds currently present a problem within the shortgrass prairie area of Boulder Reservoir. Control of noxious weeds should be prioritized based on threats to intact areas of native shortgrass prairie, state control requirements, and resources.

## **Biological Resources of High-Priority Conservation Targets**

### ***Vegetation Communities***

Boulder Reservoir has a wide range of plant communities – from various aged plains cottonwood stands to native short-grass prairie. In previous studies, these communities have been broadly described with several different types of communities lumped together. For example, the short-grass prairie community shown in the 2012 BRMP (Boulder 2012a) includes both high-quality native short-grass prairie and previously disturbed pasturelands dominated by introduced grasses.

In order to recommend specific management goals for Boulder, a more detailed vegetation community inventory should be conducted. Understanding where high-quality, difficult-to-reestablish vegetation communities occur compared to low-quality communities would be critical to designing facilities that minimize impacts on the ecosystems. The vegetation inventory either can be for the entire Boulder Reservoir site or targeted to high-value areas, such as the West Shore, Coot Lake western wetlands, and areas vulnerable to human activities, such as around the North Shore.

### ***Rare Plants***

Although rare plants, such as Bell's twinpod, have been noted within Boulder Reservoir, the locations of known or potential habitat are not well understood. Potential habitat for any rare plants that may occur within the Boulder Reservoir site should be mapped and presence/absence surveys conducted when the plants are flowering. This mapping would assist Boulder Reservoir staff in managing these areas to preserve and protect the rare plants from harmful activities. For example, if an area contains both rare plants and noxious weeds, certain weed-control methods should be avoided to prevent harm to the rare plants.

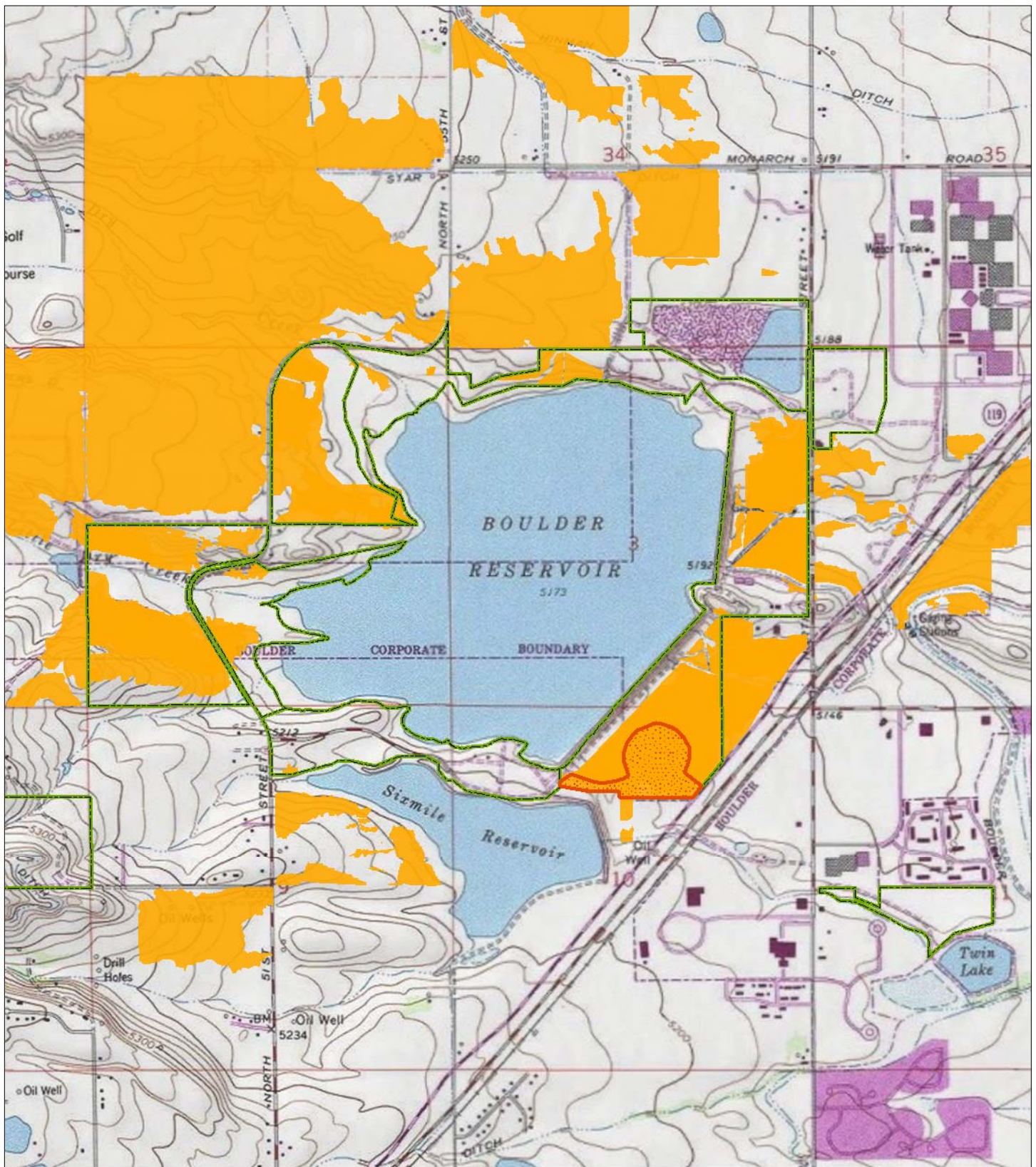
### ***Noxious Weeds***

Department staff spends significant man hours and budget on controlling noxious weeds. This weed management program has resulted in the reduction and elimination of many populations of noxious weeds, improving the quality of the vegetation communities currently at the reservoir. However, many areas at the reservoir still degraded by invasive weeds would benefit from increased weed management. Preventing




reintroduction of these invasive plants, as part of a detailed integrated weed management plan should be a high priority when constructing any facilities or conducting any other activities within the reservoir, such as races, special events, and firefighter staging. Additionally, the noxious weed plans should be reviewed and updated as needed to set priorities based on state regulations, the feasibility of control, and the vulnerability of noxious weed invasions specifically within Boulder Reservoir. Updated weed plans should identify areas at risk of invasion, areas of high-quality vegetation that should be protected, and policies and processes to prevent noxious weed introductions.

### ***Prairie Dogs***

Most of the upland grasslands at Boulder Reservoir have been occupied by prairie dogs at some time in the past (Figure 6). Populations in Boulder County, and specifically at the reservoir, have fluctuated widely over the last several decades, due primarily to disease. In spring 1986, a Sylvatic plague epizootic swept through the Boulder Reservoir area, killing most of the prairie dogs in that region (Geitzen et al. 1996). By 1996, prairie dogs again occupied 297 acres at the reservoir. The Boulder Reservoir area was again affected by Sylvatic plague between 2005 and 2009 (Figure 7). By 2011, prairie dog populations at Boulder Reservoir and in the surrounding area showed signs of recovery (Figure 8 and Figure 9). Active prairie dog colonies recovered from 93.7 acres in 2008 to 296.6 acres in 2011 (Boulder Open Space and Mountain Parks (OSMP) 2011).



## Boulder Reservoir Biological Species Analysis

-  Prairie Dog Colony
-  Fire Training Area
-  Park Boundary

Data Source: City of Boulder; City of Boulder Parks and Recreation;  
City of Boulder Open Space and Mountain Parks

0 1,000 2,000  
Feet



Figure 6

Composite Map of All Areas On and Near Boulder Reservoir Occupied by Prairie Dogs at Some Time Between 1996 and 2012

Prepared for: City of Boulder Parks and Recreation  
File: 5200 fig 6 p-dog composite.mxd (WH)  
February 2013

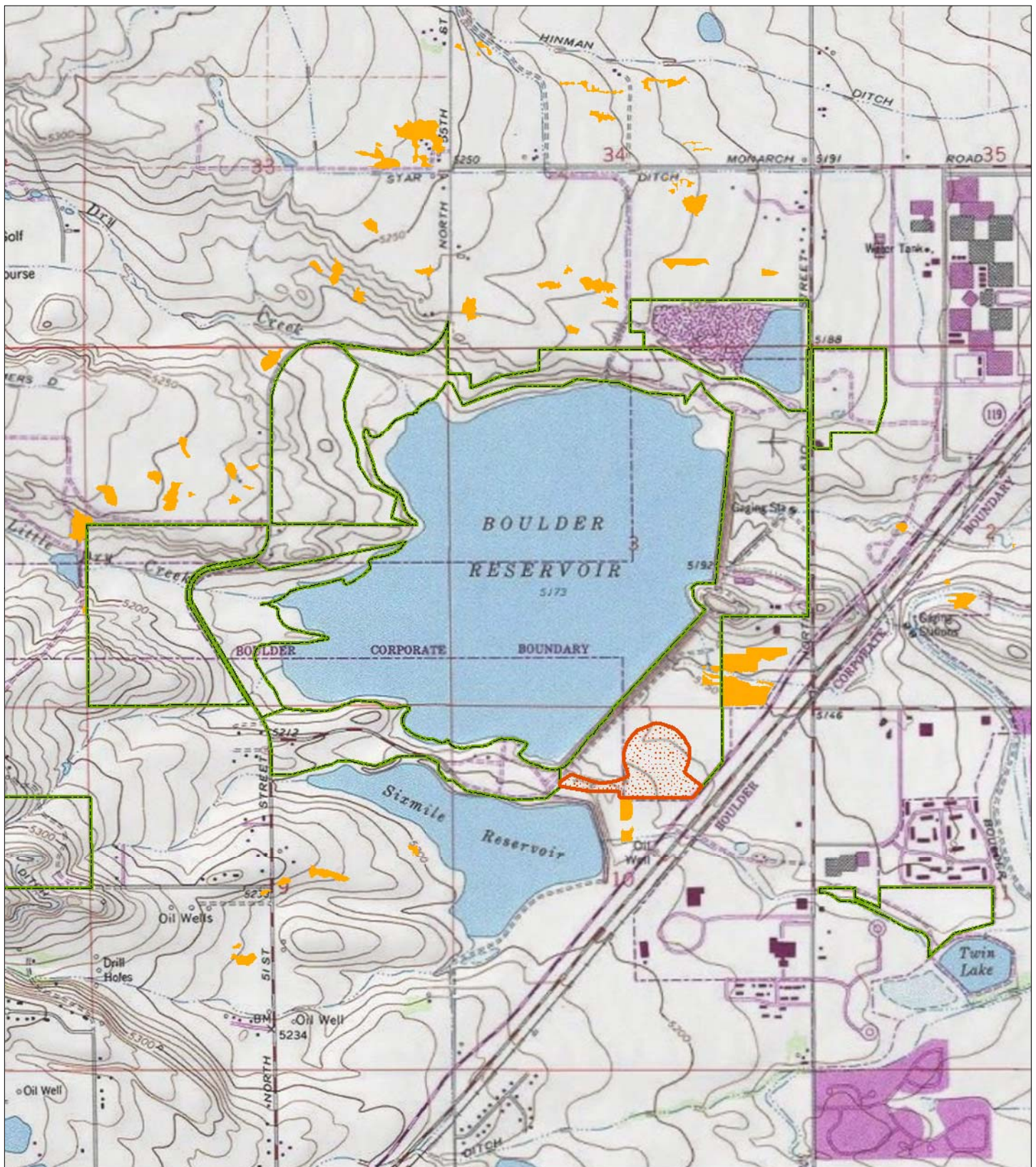
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### ***Northern Harriers***

Historically, northern harriers were fairly common breeders in Boulder County. Wetlands on the west side of the reservoir were used by nesting northern harriers and short-eared owls prior to 1986 (CDM 1986). Beginning in 1986, Boulder began to create and restore wetlands on the west side of the reservoir to provide nesting and foraging habitat for both northern harriers and short-eared owls (Geitzen et al. 1996). Currently, harriers appear to be on the brink of extirpation from the county and Boulder Reservoir is the only location in Boulder County where northern harriers have successfully nested since 1997 (Hallock and Jones 2011). Eight consecutive nesting attempts were followed by three years of failed nests between 2005 and 2008 (Jones 2009). In 2009 and 2010, harriers nesting at Boulder Reservoir produced four and three young, respectively (Jones 2010). A single active harrier nest failed in 2011 and no northern harriers were confirmed nesting at the reservoir in 2012 (Jones 2012).

### ***American Bittern***

The American bittern (bittern) was historically common in Boulder County (Betts 1913). This species was listed as “rare and declining” in the 1999 update of the Boulder County Avian Species of Special Concern List (Hallock and Jones 1999); however, nesting populations of bitterns appear to have increased recently in the county (Jones 2009). Even though populations appear to be increasing, American bitterns are still uncommon in the county, have very specific habitat requirements, and are sensitive to human disturbance. Although it is difficult to locate actual nest sites, American bitterns have nested in cattail wetlands at Coot Lake and west of the reservoir between 2001 and 2012 (Hallock and Jones 2011; Jones 2012). At least three active nesting territories of bitterns were identified near the reservoir each year between 2006 and 2008 (Hallock and Jones 2011). In 2012, American bitterns were active at Coot Lake, Dry Creek, and Little Dry Creek, with two territories observed at Dry Creek (Jones 2012). In 2010, BCNA changed their sensitive species category for American bitterns to “No longer rare but still Isolated and Restricted” (Hallock and Jones 2011).



## Boulder Reservoir Biological Species Analysis

- Prairie Dog Colony
- Fire Training Area
- Park Boundary

Data Source: City of Boulder Parks and Recreation

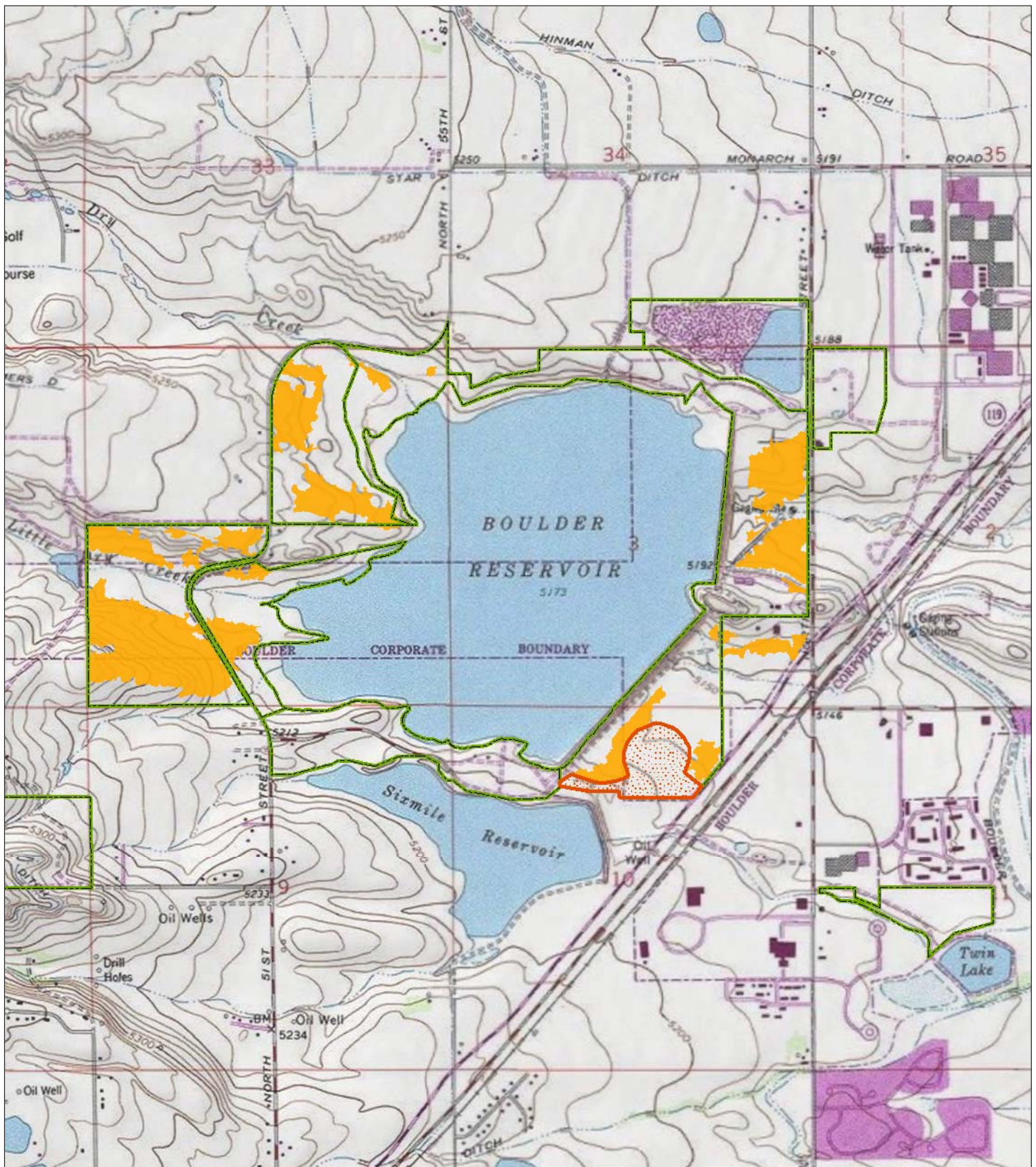
0 1,000 2,000  
Feet






**Figure 7**  
**Prairie Dog Colonies Mapped**  
**at Boulder Reservoir in 2007**

Prepared for: City of Boulder Parks and Recreation  
File: 5200 fig 7 bldr res p-dog clns 2007.mxd (WH)  
February 2013

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## Boulder Reservoir Biological Species Analysis

-  Prairie Dog Colony
-  Fire Training Area
-  Park Boundary

Data Source: City of Boulder Parks and Recreation

0 1,000 2,000 Feet



**Figure 8**  
**Prairie Dog Colonies Mapped**  
**at Boulder Reservoir in 2011**

Prepared for: City of Boulder Parks and Recreation  
 File: 5200 fig 8 bldr res p-dog clns 2011.mxd (WH)  
 February 2013

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**Figure 9. Boulder Reservoir Prairie Dog Counts 2000 – 2012**

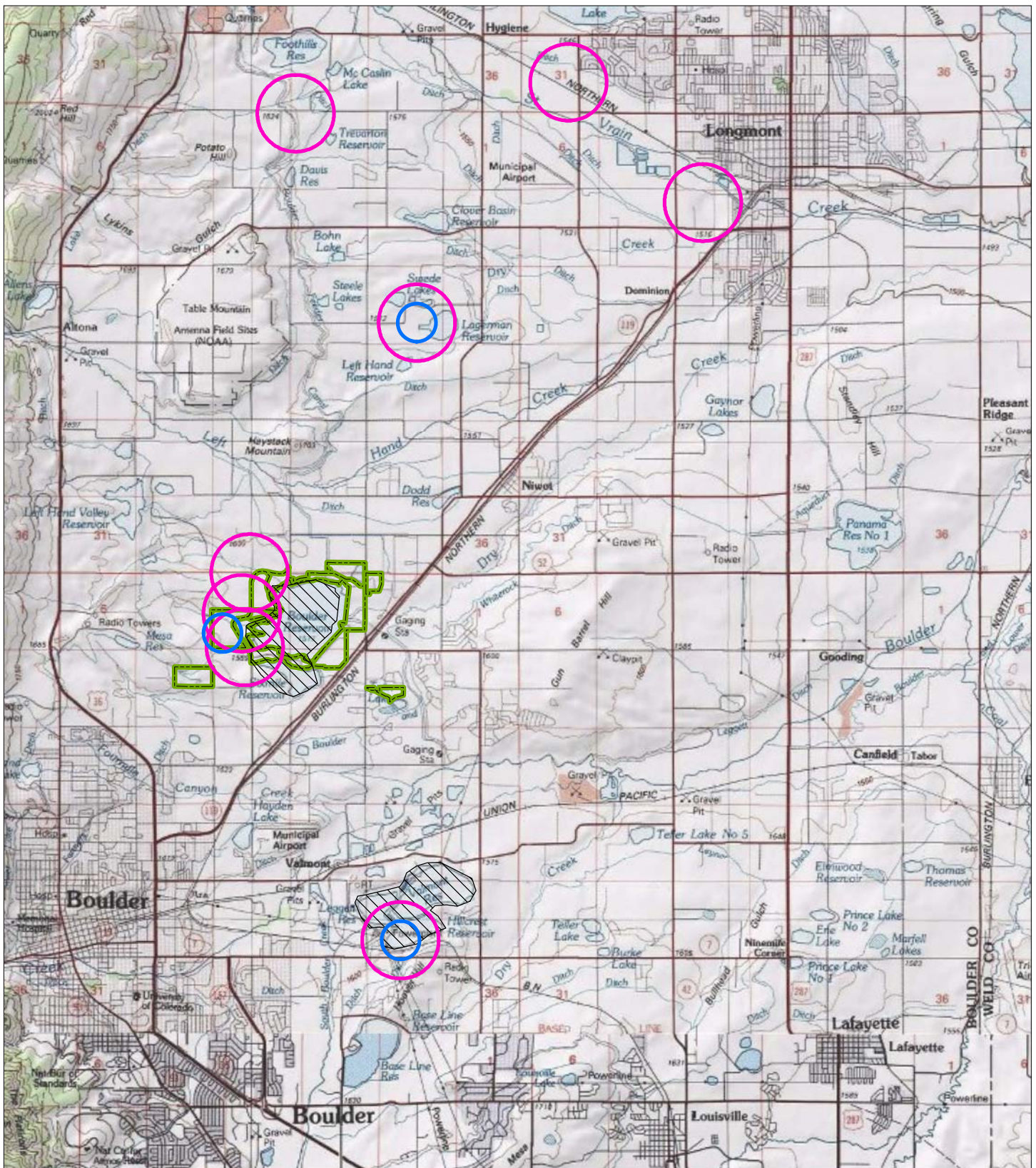


### ***Savannah Sparrow***

Savannah sparrows (sparrows) are rare to locally uncommon on the northeastern plains of Colorado (Andrews and Richter 1992). Savannah sparrows favor moist mountain meadows in Colorado; however, this species occurs throughout the state in moist, grassy meadows; irrigated fields; and streamside sedge meadows (Kingery 1998). In Boulder County, mountain populations of the sparrow appear to have declined since the early 1900s, possibly because of elimination of hay cultivation in mountain meadows (Hallock 1998). Savannah sparrows were reported in 1993 as regularly observed at Boulder Reservoir during summer (Jones 1993) and are still occasionally reported as breeding at the reservoir (Jones 2012). Jones (1993) observed sparrows singing during the breeding season in the Dry Creek drainage and west of Coot Lake. Although not considered a species of special concern by BCNA or CPW, the savannah sparrow is a good indicator of wetland ecosystem health.

### ***Osprey***

The osprey was historically a rare to nonbreeder in Boulder County (Hallock and Jones 2011). Currently ospreys are uncommon to fairly common breeders in Boulder County. The number of active nesting territories for ospreys has increased over the last decade in Boulder County, and BCNA reported nesting at 12 or more known locations in eastern Boulder County and at least 2 locations in the mountains between 2001 and 2010 (Hallock and Jones 2011). CPW and OSMP mapping indicates that between 2006 and 2011, osprey nesting in the plains between Boulder and Longmont has increased from three to possibly eight active territories, including territories at Boulder Reservoir and the Axelson Open Space property northwest of the reservoir (Figure 10) (Colorado Natural Diversity Information Source (CNDIS) 2012; Jones 2012). Ospreys were first reported nesting in Boulder County at Boulder Reservoir on Little Dry Creek in 2001 and ospreys have nested successfully near the reservoir annually since 2001, producing at least two young each year (Jones 2009; Hallock and Jones 2011; Jones 2012). In 2012, one osprey nest at Boulder Reservoir fledged three young, while the second nest was unoccupied (Jones 2012). The nest on the Axelson property failed (Jones 2012). The BCNA currently considers osprey as “No longer Rare but still Isolated and Restricted” (Hallock and Jones 2011).



## Boulder Reservoir Biological Species Analysis

- Osprey 1/4-Mile Active Nest Site Buffer (2006)
- Osprey 1/2-Mile Active Nest Site Buffer (2011)
- Park Boundary
- Osprey Foraging Area (2006 - 2011)

Sources: Colorado Parks and Wildlife, Natural Diversity Information Source; City of Boulder Parks and Recreation

0 1 2 Miles



**Figure 10**  
**Osprey Nest Sites and Foraging Areas**

Prepared for: City of Boulder Parks and Recreation  
File: 5200 fig 10 osprey habitat.mxd (WH)  
February 2013

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### ***Short-eared Owl***

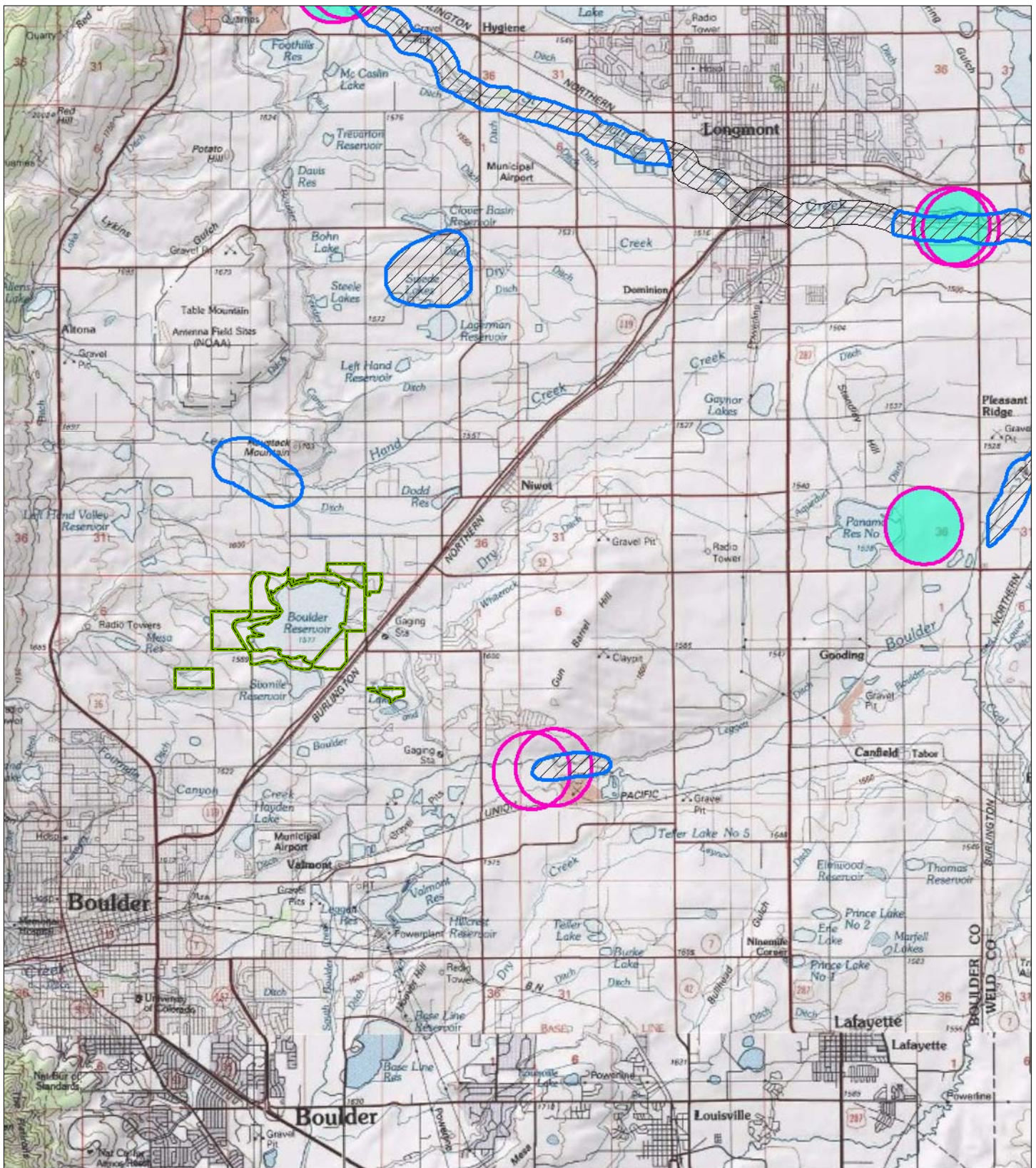
The short-eared owl was historically a rare winter visitor to Boulder County (Hallock and Jones 2011), although this species is commonly reported during winter inventories. Short-eared owls have been reported to the Boulder Audubon Society Monthly Wildlife Inventory during 20 of 26 winters from 1981 to 2006, often associated with the cattail wetlands at the reservoir (Hallock and Jones 2011). From 1979 to 2009, individual short-eared owls were reported during winter at the reservoir in 9 of the 20 years (Jones and Mahoney 2010).

### ***Bald Eagle***

Bald eagles historically were occasional migrants or winter residents in Boulder County with no known breeding (Geitzen et al. 1996; Kingery 1998). Over the last decade, both the number of summer nest sites and winter roost sites in Boulder County have increased (Figure 11) (CNDIS 2012). CPW mapping indicates that between 2006 and 2011, bald eagles nesting in the plains between Boulder and Longmont have increased from two to three active territories (Figure 11). Prior to 1984, few bald eagles had been sighted in the reservoir area (Geitzen et al. 1996). Currently bald eagle winter range extends throughout most of eastern Boulder County and eagles are commonly observed at the reservoir in winter. Bald eagle winter forage areas are concentrated on lake and river habitats along Boulder and St. Vrain creeks and larger reservoirs, including Boulder Reservoir (Figure 12). Winter bald eagle observations at Boulder Reservoir mostly occur on or around the reservoir or near prairie dog colonies.

### ***Raptors***

In addition to the raptor species described above, Boulder Reservoir supports numerous other raptor species and nesting red-tailed hawks, Swainson's hawks, great horned owls, and American kestrels. In winter, as many as nine species of raptors have been observed perching, foraging, and roosting at the reservoir, primarily along Dry and Little Dry creeks and east of the dam (Figure 13). Historic Audubon Christmas Bird Count data (1978–2010) suggest that wintering raptors, particularly those that feed on prairie dogs, were less numerous in Boulder County during the 1950s and 1960s than during the 1970s, 1980s, and 1990s. Prior to 1970, ferruginous hawks and bald eagles



## Boulder Reservoir Biological Species Analysis

- Bald Eagle 1/2-Mile Active Nest Site Buffer (2008)
- Bald Eagle 1/2-Mile Active Nest Site Buffer (2011)
- Bald Eagle Roost Site (2006)
- Bald Eagle Roost Site (2011)
- Park Boundary

Source: Colorado Parks and Wildlife, Natural Diversity Information Source

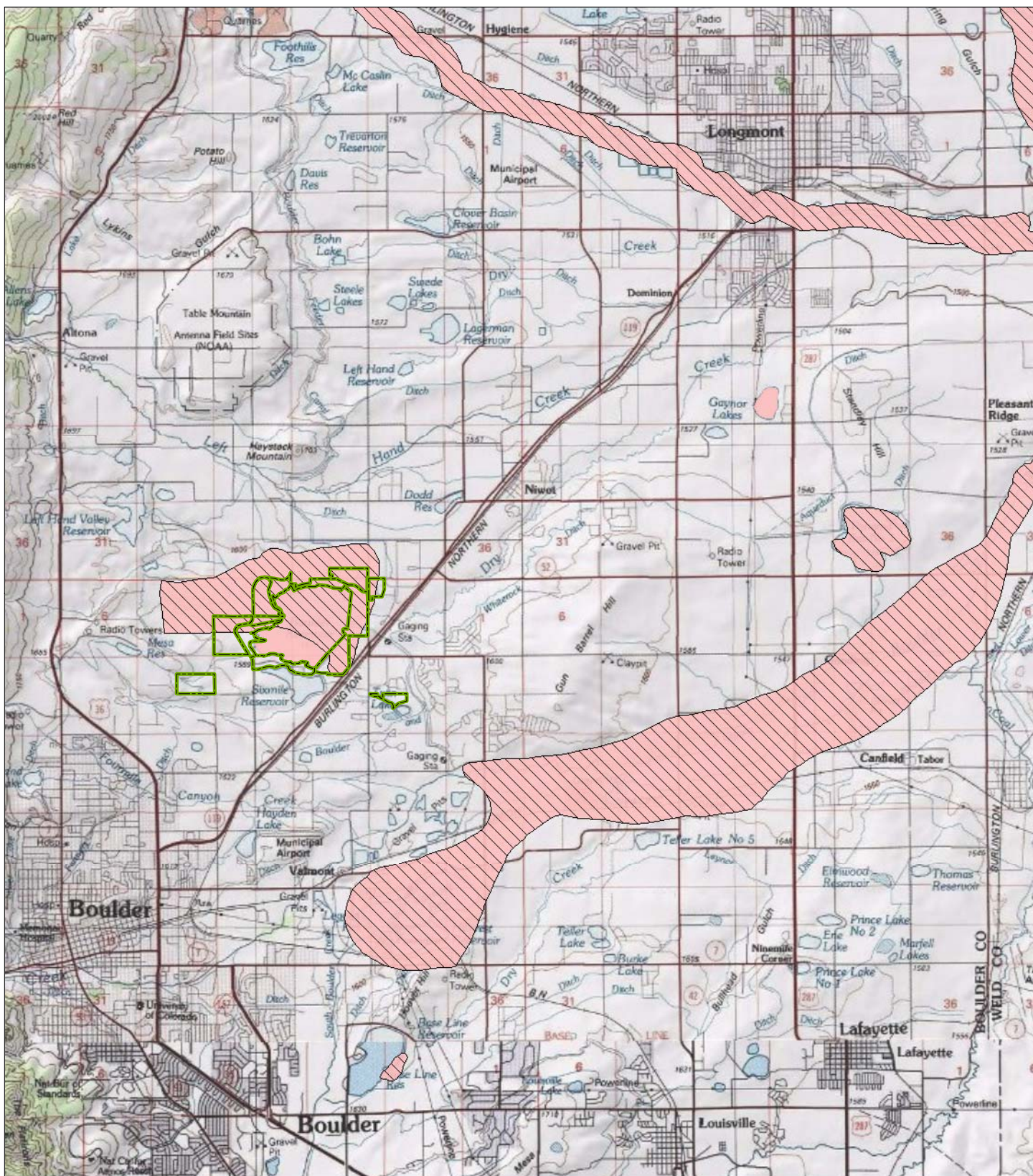
0 1 2 Miles






**Figure 11**  
**Bald Eagle Nest and Roost Sites**  
**Mapped by Colorado Parks and Wildlife**

Prepared for: City of Boulder Parks and Recreation  
File: 5200 fig 11 be nest & roost sites.mxd (WH)  
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## Boulder Reservoir Biological Species Analysis

-  Winter Forage (2006)
-  Winter Forage (2011)
-  Park Boundary

Source: Colorado Parks and Wildlife, Natural Diversity Information Source

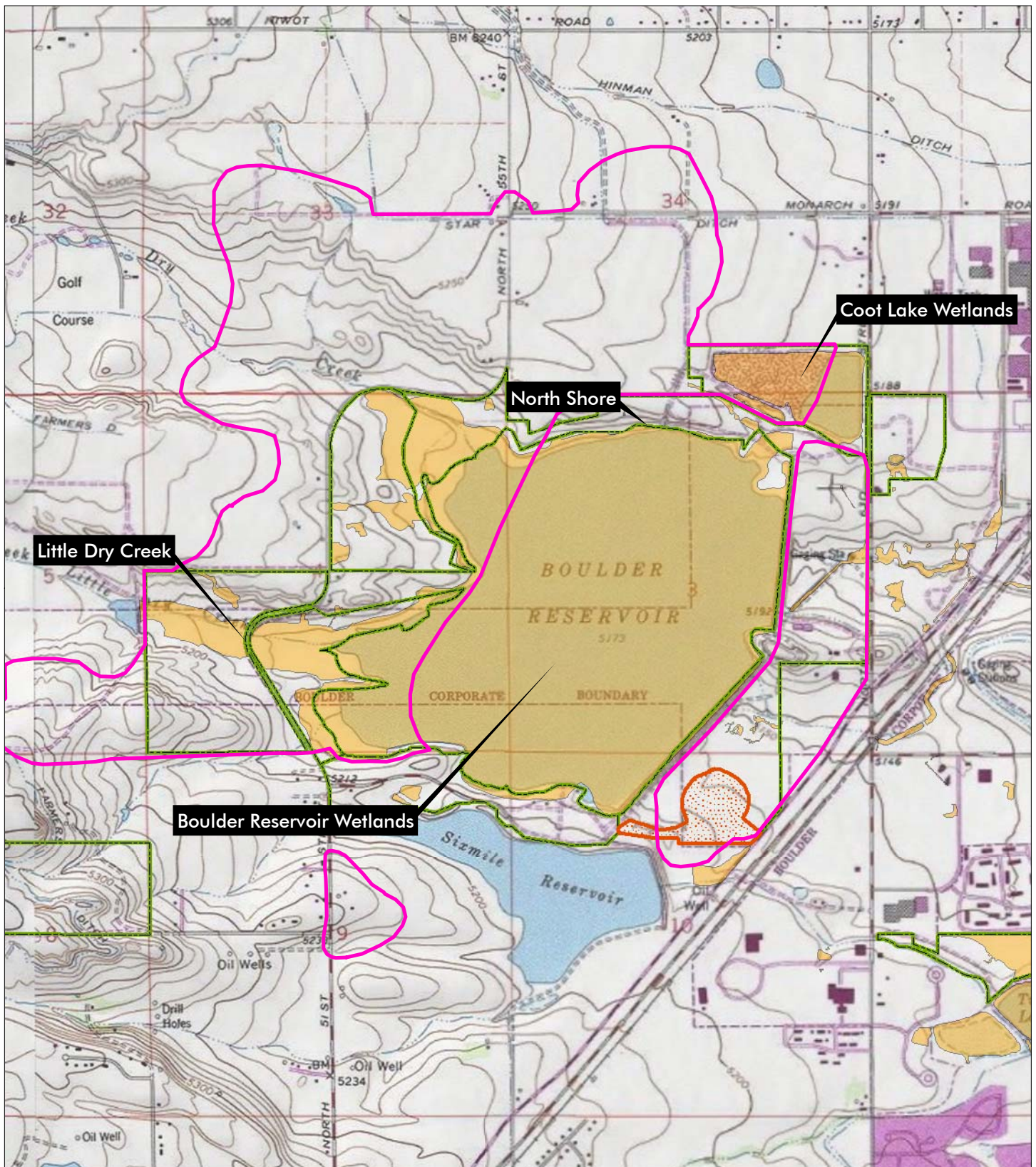
0 1 2 Miles



**Figure 12**  
Bald Eagle Winter Forage  
Mapped by Colorado Parks  
and Wildlife

Prepared for: City of Boulder Parks and Recreation  
File: 5200 fig 12 bald eagle winter forage.mxd (WH)  
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## Boulder Reservoir Biological Species Analysis

- Concentration Area
- Wetland Regulated by the City of Boulder (2009)
- Fire Training Area
- Park Boundary

Sources: Jones (2003); City of Boulder Parks and Recreation

0 1,000 2,000  
Feet



**Figure 13**  
**Boulder Reservoir Winter**  
**Raptor Concentration Areas**

Prepared for: City of Boulder Parks and Recreation  
File: 5200 fig 13 bldr res wntr rpt conc.mxd (WH)  
February 2013

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were rarely seen in Boulder County (Geitzen et al. 1996). The number of ferruginous hawks, red-tailed hawks, and bald eagles seen on Boulder Audubon Christmas Counts increased throughout the 1970s and early 1980s (Geitzen et al. 1996; Kingery 1998). The number of these three species more than doubled from 1984 to 1986, coinciding with a steady increase in the number of prairie dogs in the Boulder Reservoir region (Geitzen et al. 1996). Plague epizootics, killing many prairie dogs within Boulder County during 1985–1986 and 1993–1994, caused sharp short-term declines in the populations of wintering ferruginous hawks, red-tailed hawks, and bald eagles.

Volunteers for the BCNA have counted wintering raptors along designated survey routes in Boulder County for more 25 years (BCNA 2012; Geitzen et al. 1996) and additional surveys and monitoring have been conducted by Department staff and volunteers. These surveys have found that:

- Wintering raptor populations in Boulder County fluctuate with prey resources. The BCNA noted that in the area along U.S. 36 “numbers of ferruginous hawks and bald eagles seen on winter raptor surveys declined by more than 85% from 1993-96 as one prairie dog colony after another succumbed to development.”
- Wintering raptors, particularly those that feed on prairie dogs, were less numerous in Boulder County during the 1950s and 1960s than during the 1970s, 1980s, and 1990s.
- In spring, 1986, a Sylvatic plague epizootic swept through the Boulder Reservoir–Haystack Mountain area, killing most of the prairie dogs in that region. By the following winter, ferruginous hawk sightings on the Boulder Reservoir survey route had declined by 70 percent, and bald eagle sightings had declined by more than 90 percent.
- The 1993–1994 plague epizootic affected prairie dog colonies throughout Boulder County, including Boulder Reservoir, and contributed to a countywide decline in the number of ferruginous hawks, red-tailed hawks, and bald eagles.
- A more recent plague epizootic in 2005–2007 at Boulder Reservoir (Figure 9) again reduced prey resources for wintering and nesting raptors.

### ***Frogs***

The northern leopard frog was once widespread across North America, but has sharply declined nationally and has become scarce in many areas of Colorado (Hammerson 1999). The northern leopard frog is a species of special concern in

Colorado. The bullfrog is a large nonnative frog species in Colorado that can outcompete and prey on native amphibians. In 2006, OSMP initiated northern leopard frog surveys (Germaine 2007). The goal of the surveys was to document the current distribution of leopard frogs and bullfrogs in OSMP wetlands. The surveys did not include Boulder Reservoir or OSMP parcels near the reservoir. The surveys were conducted in four types of wetlands – ponds, perennial streams, intermittent streams, and irrigation ditches. In total, 32 wetlands were surveyed by volunteers with 172 leopard frogs and 1,102 bullfrogs observed (Germaine 2007). Leopard frogs and bullfrogs each occurred at approximately 50 percent of the sites surveyed; leopard frogs were more abundant than bullfrogs at irrigation ditches and bullfrogs were more abundant than leopard frogs at the other three wetland types (Germaine 2007). Bullfrogs appeared more abundant at ponds and both the number and distribution of bullfrogs appeared to have increased in the 10 years between 1996 and 2006.

#### ***Aquatic Nuisance Species***

As previously mentioned, ANS are a growing management concern in Colorado due to their potential to spread rapidly and their adverse ecological and economic impacts. To help address this concern, an ANS Prevention Plan was developed for Boulder Reservoir in 2010 (Bonnell 2010). Following is a summary of the information in Bonnell (2010). Boulder Reservoir has been identified as high risk for two ANS – zebra and quagga mussels (Bonnell 2010). Conditions at the reservoir are favorable for mussel development and recreational boating provides the potential for overland transport from distant infested waters. Prevention is the most cost-effective and ecologically sound way to address ANS. Once infested, the costs to control ANS are exorbitant. Boulder Reservoir is not currently infested with ANS. To maintain this ANS status, the Department has implemented both the state's management guidelines and the more specific recommendations of the Boulder Reservoir ANS Prevention Plan (Bonnell 2010). The recommendations of the ANS Prevention Plan include a) enhancing preventive practices, b) continuing to monitor for ANS, c) detecting ANS early and responding rapidly, d) containing and controlling ANS, e) supporting research on ANS, f)

enhancing education about ANS, and g) evaluating and improving ANS prevention and management action (Bonnell 2010).

## Recommendations

ERO has the following recommendations for developing the biological resource data needed for the public involvement phase of the BRMP planning process and developing a detailed Biological Resources Management Plan. Recommendations are presented by management area, including several reservoir-wide recommendations (Table 2).

Although Coot Lake is within the North Shore management area, several recommendations specifically identify Coot Lake as a focal resource.

**Table 2. Desired Future Conditions and Recommendations Matrix.**

Desired Outcome	Indicator Resource	Management Areas	Recommendations by Management Area
Reservoir-wide			
Improved baseline inventory on biological resources	Flora	All	Conduct a floristic survey
	Noxious weeds	All	Map weeds
	Wetlands	All	Update and enhance wetland mapping,
	Landscape	All	Map geological and landscape features
	Breeding birds	All	Conduct baseline breeding bird survey following breeding bird atlas protocol; focus on indicator species
	Bats	All	Conduct baseline bat inventories
	Mammals	All	Conduct large and small mammal inventories
Improved long-term monitoring of wildlife	Frogs and toads, insects, and butterflies	All with focus on West Shore, North Shore, and Coot Lake	Develop “Citizen Science” monitoring programs for wildlife communities not currently monitored (frogs and insects)
	Breeding birds	All with focus on West Shore, North Shore, and Coot Lake	Develop “Citizen Science” annual breeding bird survey
Integrated restoration plan	Vegetation	All	Develop restoration plan and restoration criteria
Open Water and Shoreline			
Stable shorelines	Shoreline	Coot Lake	Monitor shoreline erosion
Healthy aquatics and shoreline communities	ANS	Reservoir, West Shore	Implement ANS plan
		West Shore	Continue West Shore seasonal closure
Herbaceous Wetlands			

BIOLOGICAL SPECIES ANALYSIS  
BOULDER RESERVOIR  
BOULDER COUNTY, COLORADO

Desired Outcome	Indicator Resource	Management Areas	Recommendations by Management Area
Maintain and increase protection of wetlands		West Shore and Coot Lake	Seasonal closure, barriers, and educate visitors
High-functioning wetlands		West Shore and Coot Lake	Noxious weed control
Protection of high-value wildlife habitat		West Shore and Coot Lake	Prepare detailed biological site assessment
Protection of high-value bird habitat	American bittern, northern harrier, savannah sparrow, common yellowthroat, Wilson’s snipe, red-winged blackbird	West Shore and Coot Lake	Inventory breeding birds (see reservoir-wide)
Wooded Riparian			
Healthy multistructured riparian community	Song sparrow, yellow breasted chat, yellow warbler, bullocks oriole, and warbling vireo	West Shore and North Shore	Inventory breeding birds (see reservoir-wide)
	Riparian vegetation	West Shore and North Shore	Protect and enhance North Shore riparian
	Cottonwood trees	West Shore and North Shore	Monitor wooded riparian
	Negative indicators – Russian olive, noxious weeds, European collared dove	West Shore and North Shore	Control Russian olive and othernoxious weeds
Shortgrass Prairie			
Healthy native vegetation community	Shortgrass vegetation, western meadowlark, vesper sparrow, grasshopper sparrow	West Shore and North Shore	Revegetate disturbed and weed-infested areas
		West Shore and North Shore	Manage and control noxious weeds
		West Shore and North Shore	Restore prairie
		West Shore and North Shore	Monitor vegetation next to trails
Disturbed/Urban Parkland			
Educate visitors		South Shore	Educate visitors

BIOLOGICAL SPECIES ANALYSIS  
BOULDER RESERVOIR  
BOULDER COUNTY, COLORADO

Desired Outcome	Indicator Resource	Management Areas	Recommendations by Management Area
<i>High-priority Conservation Targets</i>			
Rare plants	Rare plants	All, with focus on West Shore and North Shore	Conduct detailed surveys in suitable habitat
Prairie dogs	Prairie dogs, burrowing owls	All	Continue annual monitoring of prairie dogs
Avian species of concern	Avian species of concern	All	Continue annual monitoring of avian species of concern
Raptors	Raptors	All	Expand winter raptor surveys
Frogs	Frogs	Focus on West Shore and Coot Lake	
Aquatic nuisance species	ANS	Reservoir and Coot Lake	Implement ANS plan

## Vegetation

### *General Recommendations*

- Complete a sustainable biological resources management plan.
- Conduct a floristic survey of the entire Boulder Reservoir ecosystem to target where the different plant communities occur and determine their plant composition, including locations of any high-value native patches and rare plant species. This survey should include noxious weeds. If a complete floristic survey is not feasible, at a minimum, survey areas where disturbances are planned.
- Update wetlands mapping, including a full description of functions.
- Avoid building facilities or planning activities within highly functioning wetland communities that would be difficult to replace. For example, prairie cordgrass-dominated communities take a long time and are difficult to reestablish after disturbance.
- Map geological and landscape features. This information should be used in conjunction with the floristic survey to describe plant communities. At a minimum, map the features around areas to be disturbed, although understanding the geology and landscape of the entire site would be valuable to all planning efforts.
- Revegetate all disturbed areas using appropriate plant species and revegetation techniques. The specific composition of native prairie species to plant in an area depends on topography, soils, and water source. Optimally, only native species should be used.

- Manage and control noxious weeds as required by the State of Colorado Noxious Weed Act (CDOA 2012). Noxious weed control strategies and efforts should be determined by Boulder staff, with priorities given to:
  - Species targeted by the state for eradication (list A).
  - Infestation within high-quality native areas or rare plant habitat.
- Manage invasive species, such as Russian olive, that often outcompetes native vegetation and wildlife habitat. Monitor native grasslands that occur next to trails or other heavily trafficked areas to determine if foot traffic has decreased the native species composition and cover and increased noxious weeds. This monitoring should include measurement of the width of the trail and documenting any social trails that develop in the shortgrass prairie so that they can be removed. Monitoring efforts would also include:
  - Photo points – taken from the same location each year.
  - Vegetation description – either generally describe the vegetation including estimates of species cover or for a more complete picture establish permanent transects.
- Monitor wooded riparian communities along the reservoir shore and Coot Lake. Where recreational activities occur, establish several monitoring locations within each of three types of wooded riparian stands. For each monitoring location, record species composition, cover, and evidence of recreational activities. The three stands to monitor are:
  - **High-quality stand** – A healthy plains cottonwood stand with an understory of sandbar willows and native herbaceous species should be monitored to determine if human activities would negatively affect the stands in the future. Evidence of negative recreational impacts include a decrease in overall plant cover, decrease in native species, and an increase in noxious weeds and other nonnative species such as reed canarygrass.
  - **Medium-quality stand** – A stand with a mixture of native and nonnative species that show evidence of moderate recreational impacts. This stand should be monitored to determine if changes in recreational use causes changes in the vegetation.
  - **Low-quality stand** – A stand with mostly bare understory should be monitored to see if vegetation establishes over time. Recruitment of cottonwood seedlings should be especially noted.

## Recommendations by Management Area

### *North Shore including Surrounding Shortgrass Prairie*

- Monitor trails (as described above) near native shortgrass prairie stands to determine the effects of recreational activities.

- Monitor shoreline riparian habitat – Monitor the bands of cottonwoods (as described above) to determine if tree regeneration is occurring and the effects of recreational activities. Determine areas where restoration is feasible and what actions are needed to allow establishment of healthy wooded riparian communities. Restoration areas may include:
  - where fencing or other barriers could be placed to allow vegetation to regrow without trampling; and
  - where planting of willows and herbaceous vegetation would help control erosion along the shore.

#### ***Coot Lake***

- Monitor shoreline riparian habitat – Monitor locations along the southern shore of Coot Lake where stands of native vegetation have established to determine the effects of recreational activities.
- Monitor shoreline erosion – Monitor the south and east shores of Coot Lake to determine the effects of erosion and the effectiveness of maintenance or revegetation activities to halt erosion.
- Monitor Wetlands – Each year take photos as permanent photo points established within the western wetland to monitor changes to the existing conditions. This will allow any potential detrimental effects, such as a new noxious weed invasion, to be caught early and controlled more easily.

#### ***North and South Dam***

- The sitewide floristic survey should determine if grasslands on the North and South dams are degraded and need restoration. Based on the survey, the Department should develop a detailed restoration plan that considers soils (which may be alkaline), aspect, exposure, and other barriers to the establishment of healthy native grasslands.

#### ***South Shore***

- Educate visitors – Provide signs, pamphlets, or other means of educating boaters and other visitors on the importance of seasonal closures and the rules and regulations to protect vegetation and wildlife resources.

#### ***West Shore***

- Prepare a detailed biological sites assessment – Conduct a detailed survey of the plant and animal communities to determine opportunities and constraints for future trails and other recreational development. Opportunities include areas where a physical trail and the human disturbance associated with trails would have negligible effects on sensitive biological resources. Constraints include areas of high sensitivity that support sensitive plant and animal resources that should be avoided and mitigated.
- Establish restoration criteria – Based on the biological site assessment, identify restoration criteria based on ecological sensitivity. For example, areas with plant communities dominated by hard to reestablish species, such as prairie cordgrass,

should receive the most stringent restoration criteria, such as using native seeds collected locally.

## **Wildlife**

### ***General Recommendations***

- Continue annual monitoring of Boulder County Avian Species of Concern.
- Continue annual monitoring of prairie dog colonies.
- Implement the site-specific recommendations of Steve Jones (2012). ERO has reviewed, and agrees with, the recommendations developed by Mr. Jones based on his extensive experience studying sensitive bird species at Boulder Reservoir. In terms of the model airplane facility and Coot Lake western wetland, the Department may need to conduct systematic surveys to support any restrictions in this area.
- Develop a “Citizen Science” frog monitoring program in cooperation with Boulder OSMP (described below).
- Develop a “Citizen Science” breeding bird monitoring program.
- Develop a “Citizen Science” insect and butterfly monitoring program.
- Work with BCNA to expand systematic surveys for wintering raptors.
- Conduct large and small mammal inventories within each vegetation community by management area.
- Work with the Colorado Bat Society to conduct baseline bat inventories.
- Vigorously implement the Boulder Reservoir ANS plan.

### ***Recommended Indicator Species for Monitoring and Management***

Many of the wildlife species described in this report provide clues and indications of the overall ecosystem and/or specific vegetation community health. As part of the master planning process, the Department will identify the desired ecological conditions for Boulder Reservoir (e.g., healthy riparian woodlands and habitat for species of concern) and establish goals and objectives for obtaining those conditions. The Department has actively monitored and/or managed through habitat enhancement and seasonal closures, many of the Boulder County species of concern at the reservoir. Other wildlife species/communities may be selected as indicators of desired ecological conditions or adaptive management thresholds as the BRMP is implemented. A list and brief description of possible wildlife indicator species is provided below.

- **Prairie dogs** – Prairie dogs are often considered a keystone species, and a healthy prairie dog community provides habitat for numerous other bird, mammal, reptile, and invertebrate species. Prairie dogs are also easily monitored and mapped. Prairie dogs are very susceptible to disease, particularly sylvatic plague. The Department should continue to map and monitor prairie dog colonies as an indicator of ecosystem health and work to promote healthy populations. The Department should also be opportunistic and implement native grassland restoration immediately following any plague event.
- **Raptors** – Raptors, as top predators, can be good indicators of ecosystem health and decreases/increases in populations or productivity can indicate responses to physical factors of the habitat such as contaminants, climate, and severe weather events; ecological factors such as prey abundance and availability; or behavioral factors such as nest abandonment and decreased productivity from stress/human disturbance. Changing species composition, such as more human-sensitive species being replaced by more human-adapted species, can indicate changing human population or disturbance effects. However, as wide-ranging and territorial species, raptors are more appropriate as indicators of regional or landscape changes, rather than small isolated parcels.
- **Osprey** – Osprey have some of the same characteristics and limitations as raptors; in general because they are prey specialists (fish) and have limited foraging resources in the Boulder Reservoir area. Changes in nest occupancy and productivity can indicate changes in prey abundance and availability, prey quality, and human disturbance at the nest site or foraging areas.
- **Amphibians** – Amphibians are frequently used as ecological indicators, particularly for aquatic ecosystems. Amphibians are sensitive to habitat changes and environmental conditions such as water quality, temperature, and turbidity. Frogs and toads can be identified during all life stages, including eggs, larva (tadpole), and metamorphosed adults, and can be surveyed during the day or at night using spotlighting or call back techniques. OSMP initiated a northern leopard frog inventory on open space properties in 2006 (Germaine 2007).
- **Avian wetland indicators** – Birds can be particularly good indicator species because they are generally active during the day, easy to see, can be sensitive to changing habitat conditions, and are suitable for citizen science monitoring. Suitable wetland indicator species include species of concern such as northern harrier, American bittern, and savannah sparrow, but can also include wetland obligate species such as common yellowthroat, Wilson's snipe, and red-winged blackbird.
- **Avian riparian indicators** – Suitable avian riparian indicators described above include yellow warbler, yellow-breasted chat, song sparrow, Bullock's oriole, and warbling vireo. A negative indicator may be the increasing populations of European collared dove, particularly if there is a correlation with decreased populations of mourning dove.

- **Avian upland indicators** – Besides burrowing owls, which are largely dependent on the occurrence and distribution of fluctuating prairie dog populations, suitable upland indicator species include western meadowlark, vesper sparrow, and grasshopper sparrow.
- **Small mammal community** – A change in species abundance/richness can provide an indication of community or ecosystem health; however, small mammal populations can be highly variable from year to year and monitoring requires extensive trapping and long-term monitoring.
- **Aquatic Nuisance Species** – The Department has already established an ANS threshold of Zero ANS in the reservoir as part of their ANS Prevention Plan (Bonnell 2010). The Department should vigorously implement the ANS plan and continue to work with CPW to monitor the reservoir and watercraft, and prevent introduction of ANS.
- **Bats** – Very little information is currently known about bat populations on Boulder Reservoir and surveys for the presence and distribution of bats would benefit potential future bat management.

## Summary

Boulder Reservoir is a water storage facility that is heavily used for a variety of recreational activities. These activities have impacted the vegetation and wildlife resources at the Boulder Reservoir. To manage these impacts, the Department is developing the Boulder Reservoir Master Plan to establish a long-range vision, goals, and objectives. To provide the biological resource data needed by the Department to develop this plan, ERO collected existing information to illustrate past and present ecological conditions and describe desirable future conditions for four ecological communities at Boulder Reservoir. A summary of this information is provided below by ecological community:

- **Reservoir-wide** – Detailed information on biological resources at Boulder Reservoir is lacking or dated. Improved baseline inventory of biological resources at the reservoir and implementation of long-term monitoring programs would assist the Department in developing science-based management decisions and identifying adaptive management thresholds and decisions points.
- **Open Water and Shorelines** – The open water community is generally healthy and provides important habitat for waterfowl and other wildlife; although this community is vulnerable to invasion by European milfoil and ANS. Parts of the reservoir and Coot Lake shorelines are being eroded by wave action. Further studies are needed to determine what actions may be possible to halt the erosion along the reservoir and Coot Lake. Maintaining and increasing protections along the western end of the reservoir would protect the large number of waterfowl and

other wildlife that use the reservoir. Aggressive implementation of the ANS plan developed for Boulder reservoir is vital to protecting aquatic ecosystems, recreational activities and water supply infrastructure. .

- **Herbaceous Wetlands** – Extensive wetlands occur along the Dry Creek and Little Dry Creek tributaries flowing into the reservoir and the western end of Coot Lake. These wetlands are important wildlife habitat, especially for wetland-dependent species such as native frogs and red-winged blackbirds. These wetlands are currently functioning at a high level, but are vulnerable to disturbances from construction activities and noxious weed invasions. Controlling noxious weeds, avoiding and minimizing impacts on these wetlands through careful design of any construction activity, and monitoring the site would avoid degrading these extensive, highly functioning wetlands.
- **Wooded Riparian** – Stands of cottonwood and willow trees with willow shrubs have developed around the reservoir and Coot Lake. A healthy, multistructured riparian woodland provides diverse cover and foraging habitat for a complex range of wildlife species. Healthy woodlands occur in many locations within the reservoir – along Little Dry Creek and Dry Creek and the western end of Coot Lake; however, many of the stands are degraded, especially along the northern shore of the reservoir. One concern is that new stands may not establish because of the lack of adequate germination conditions. Human traffic, weed invasion, and shore erosion are all factors that detrimentally affect these woodlands. Further studies are needed to target the best way to manage the different areas of riparian woodlands throughout the Boulder Reservoir site.
- **Shortgrass Prairie** – Before European settlement, most of the Boulder Reservoir site was covered with native shortgrass prairie. Currently, the upland grasslands are a mixture of native patches interspersed with nonnative grasslands. Prairie dogs, grassland birds, and other wildlife use these grasslands. Areas dominated by native grasses should be protected, and degraded areas should be restored based on studies targeted to areas vulnerable to negative impacts from recreational activities.
- **Disturbed/Urban Parkland** – Most of the South Shore is dedicated to recreation and recreation-related facilities. Because of the heavy human use of the area little native vegetation and wildlife habitat exists. Active recreation activities (boating, swim beach, picnicking, special events) should continue to be concentrated on the South Shore. Because of the concentration of people in this area, the South Shore is an ideal location for developing and distributing educational materials on the value and importance of protecting the natural systems and biological resources of the reservoir.

Specific recommendations to maintain and enhance these valuable ecological communities at Boulder Reservoir are discussed in this document and are grouped by management zone. Included in this report is recommended indicator species that would

provide clues and indications of the overall ecosystem and/or specific vegetation community health.

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## **Appendix A – Study Methods**

ERO evaluated previous studies of soils, vegetation, wetlands, and riparian resources at Boulder Reservoir (Camp Dresser & McKee 1986; Design Studios West Inc. 1983; ESCO 1986; SCS 1975) to determine conditions at the time of these studies and factors that may have caused changes to these resources' wetland and riparian data. These reports were compared to the City of Boulder's wetland mapping and descriptions (City of Boulder 2012b) and recent aerial photography (Bing Maps 2012). Because the wetlands at Boulder Reservoir are part of a larger interconnected wetland system, ERO Resources Corporation (ERO) assessed the changes in wetlands over time for the plains portion of Boulder County between Boulder and Longmont (region). Riparian data, where classified as wetlands, were also studied. The historical data studied included descriptive information from a variety of reports and 1976 National Wetland Inventory (NWI) mapping of the wetlands in Boulder County (NWI 2012). The 1976 NWI mapping was compared to recent aerial photographs (Google Earth 2012) to assess what type and size of wetlands may have been lost due to urbanization and other factors.

ERO reviewed available quantitative and descriptive data available from the Boulder Parks and Recreation Department, City of Boulder Open Space and Mountain Parks (OSMP), Boulder County Nature Association (BCNA), Colorado Parks and Wildlife (CPW) and other resources to develop an understanding of any changes in wildlife communities at Boulder Reservoir and the surrounding area over time. Long-term wildlife data for the reservoir and surrounding area are generally sparse and are focused on a few highly visible and high-priority species.

To understand the current conditions of the shortgrass prairie at Boulder Reservoir and how these conditions may have changed, ERO reviewed available descriptive data from the reservoir and surrounding regional studies. These data include the 1983 Boulder Reservoir Master Plan (Design Studios West Inc. 1983) and Boulder County Soil Mapping. ERO observed the site on August 15, 2012.

## Appendix B – List of Wildlife Species Known or Likely to Occur at Boulder Reservoir

Group	Common Name	Scientific Name	Abundance
Amphibians	<a href="#">Bullfrog</a>	<i>Rana catesbeiana</i>	Common
Amphibians	<a href="#">Great Plains Toad</a>	<i>Bufo cognatus</i>	Unknown
Amphibians	<a href="#">Northern Leopard Frog</a>	<i>Rana pipiens</i>	Uncommon
Amphibians	<a href="#">Plains Spadefoot</a>	<i>Spea bombifrons</i>	Uncommon
Amphibians	<a href="#">Tiger Salamander</a>	<i>Ambystoma tigrinum</i>	Common
Amphibians	<a href="#">Western Chorus Frog</a>	<i>Pseudacris triseriata</i>	Common
Amphibians	<a href="#">Woodhouse's Toad</a>	<i>Bufo woodhousii</i>	Common
Birds	<a href="#">American Avocet</a>	<i>Recurvirostra americana</i>	Fairly Common
Birds	<a href="#">American Bittern</a>	<i>Botaurus lentiginosus</i>	Rare
Birds	<a href="#">American Coot</a>	<i>Fulica americana</i>	Fairly Common
Birds	<a href="#">American Crow</a>	<i>Corvus brachyrhynchos</i>	Common
Birds	<a href="#">American Goldfinch</a>	<i>Carduelis tristis</i>	Fairly Common
Birds	<a href="#">American Kestrel</a>	<i>Falco sparverius</i>	Fairly Common
Birds	<a href="#">American Peregrine Falcon</a>	<i>Falco peregrinus anatum</i>	Unknown
Birds	<a href="#">American Redstart</a>	<i>Setophaga ruticilla</i>	Unknown
Birds	<a href="#">American Robin</a>	<i>Turdus migratorius</i>	Common
Birds	<a href="#">American Tree Sparrow</a>	<i>Spizella arborea</i>	Unknown
Birds	<a href="#">American White Pelican</a>	<i>Pelecanus erythrorhynchos</i>	Unknown
Birds	<a href="#">American Wigeon</a>	<i>Anas americana</i>	Rare
Birds	<a href="#">Baird's Sandpiper</a>	<i>Calidris bairdii</i>	Unknown
Birds	<a href="#">Bald Eagle</a>	<i>Haliaeetus leucocephalus</i>	Unknown
Birds	<a href="#">Baltimore Oriole</a>	<i>Icterus galbula</i>	Unknown
Birds	<a href="#">Bank Swallow</a>	<i>Riparia riparia</i>	Common
Birds	<a href="#">Barn Owl</a>	<i>Tyto alba</i>	Rare
Birds	<a href="#">Barn Swallow</a>	<i>Hirundo rustica</i>	Abundant
Birds	<a href="#">Barrow's Goldeneye</a>	<i>Bucephala islandica</i>	Unknown
Birds	<a href="#">Belted Kingfisher</a>	<i>Ceryle alcyon</i>	Uncommon
Birds	<a href="#">Bewick's Wren</a>	<i>Thryomanes bewickii</i>	Common
Birds	<a href="#">Black-billed Magpie</a>	<i>Pica pica</i>	Common
Birds	<a href="#">Black-capped Chickadee</a>	<i>Poecile atricapillus</i>	Fairly Common
Birds	<a href="#">Black-chinned Hummingbird</a>	<i>Archilochus alexandri</i>	Unknown
Birds	<a href="#">Black-crowned Night-Heron</a>	<i>Nycticorax nycticorax</i>	Fairly Common
Birds	<a href="#">Black-headed Grosbeak</a>	<i>Pheucticus melanocephalus</i>	Fairly Common

Group	Common Name	Scientific Name	Abundance
Birds	<a href="#">Black-necked Stilt</a>	<i>Himantopus mexicanus</i>	Unknown
Birds	<a href="#">Blackpoll Warbler</a>	<i>Dendroica striata</i>	Unknown
Birds	<a href="#">Black-throated Gray Warbler</a>	<i>Dendroica nigrescens</i>	Unknown
Birds	<a href="#">Blue Grosbeak</a>	<i>Guiraca caerulea</i>	Fairly Common
Birds	<a href="#">Blue Jay</a>	<i>Cyanocitta cristata</i>	Fairly Common
Birds	<a href="#">Blue-gray Gnatcatcher</a>	<i>Polioptila caerulea</i>	Rare
Birds	<a href="#">Blue-winged Teal</a>	<i>Anas discors</i>	Fairly Common
Birds	<a href="#">Bobolink</a>	<i>Dolichonyx oryzivorus</i>	Uncommon
Birds	<a href="#">Bohemian Waxwing</a>	<i>Bombycilla garrulus</i>	Unknown
Birds	<a href="#">Bonaparte's Gull</a>	<i>Larus philadelphia</i>	Unknown
Birds	<a href="#">Brewer's Blackbird</a>	<i>Euphagus cyanocephalus</i>	Common
Birds	<a href="#">Brewer's Sparrow</a>	<i>Spizella breweri</i>	Rare
Birds	<a href="#">Broad-tailed Hummingbird</a>	<i>Selasphorus platycercus</i>	Fairly Common
Birds	<a href="#">Broad-winged Hawk</a>	<i>Buteo platypterus</i>	Unknown
Birds	<a href="#">Brown Creeper</a>	<i>Certhia americana</i>	Uncommon
Birds	<a href="#">Brown Thrasher</a>	<i>Toxostoma rufum</i>	Very Rare
Birds	<a href="#">Brown-headed Cowbird</a>	<i>Molothrus ater</i>	Common
Birds	<a href="#">Bufflehead</a>	<i>Bucephala albeola</i>	Unknown
Birds	<a href="#">Bullock's Oriole</a>	<i>Icterus bullockii</i>	Common
Birds	<a href="#">Bushtit</a>	<i>Psaltiriparus minimus</i>	Unknown
Birds	<a href="#">California Gull</a>	<i>Larus californicus</i>	Unknown
Birds	<a href="#">Canada Goose</a>	<i>Branta canadensis</i>	Abundant
Birds	<a href="#">Canvasback</a>	<i>Aythya valisineria</i>	Unknown
Birds	<a href="#">Carolina Wren</a>	<i>Thryothorus ludovicianus</i>	Unknown
Birds	<a href="#">Cassin's Kingbird</a>	<i>Tyrannus vociferans</i>	Unknown
Birds	<a href="#">Cattle Egret</a>	<i>Bubulcus ibis</i>	Unknown
Birds	<a href="#">Cedar Waxwing</a>	<i>Bombycilla cedrorum</i>	Unknown
Birds	<a href="#">Chestnut-collared Longspur</a>	<i>Calcarius ornatus</i>	Unknown
Birds	<a href="#">Chipping Sparrow</a>	<i>Spizella passerina</i>	Common
Birds	<a href="#">Cinnamon Teal</a>	<i>Anas cyanoptera</i>	Fairly Common
Birds	<a href="#">Clark's Grebe</a>	<i>Aechmophorus clarkii</i>	Unknown
Birds	<a href="#">Clay-colored Sparrow</a>	<i>Spizella pallida</i>	Unknown
Birds	<a href="#">Cliff Swallow</a>	<i>Petrochelidon pyrrhonota</i>	Abundant
Birds	<a href="#">Common Goldeneye</a>	<i>Bucephala clangula</i>	Unknown
Birds	<a href="#">Common Grackle</a>	<i>Quiscalus quiscula</i>	Abundant

Group	Common Name	Scientific Name	Abundance
Birds	<a href="#">Common Loon</a>	<i>Gavia immer</i>	Unknown
Birds	<a href="#">Common Merganser</a>	<i>Mergus merganser</i>	Rare
Birds	<a href="#">Common Nighthawk</a>	<i>Chordeiles minor</i>	Fairly Common
Birds	<a href="#">Common Poorwill</a>	<i>Phalaenoptilus nuttallii</i>	Fairly Common
Birds	<a href="#">Common Raven</a>	<i>Corvus corax</i>	Fairly Common
Birds	<a href="#">Common Redpoll</a>	<i>Carduelis flammea</i>	Unknown
Birds	<a href="#">Common Snipe</a>	<i>Gallinago gallinago</i>	Uncommon
Birds	<a href="#">Common Tern</a>	<i>Sterna hirundo</i>	Unknown
Birds	<a href="#">Common Yellowthroat</a>	<i>Geothlypis trichas</i>	Fairly Common
Birds	<a href="#">Cooper's Hawk</a>	<i>Accipiter cooperii</i>	Uncommon
Birds	<a href="#">Cordilleran Flycatcher</a>	<i>Empidonax occidentalis</i>	Fairly Common
Birds	<a href="#">Curve-billed Thrasher</a>	<i>Toxostoma curvirostre</i>	Unknown
Birds	<a href="#">Dark-eyed Junco</a>	<i>Junco hyemalis</i>	Common
Birds	<a href="#">Dickcissel</a>	<i>Spiza americana</i>	Unknown
Birds	<a href="#">Double-crested Cormorant</a>	<i>Phalacrocorax auritus</i>	Common
Birds	<a href="#">Downy Woodpecker</a>	<i>Picoides pubescens</i>	Uncommon
Birds	<a href="#">Eared Grebe</a>	<i>Podiceps nigricollis</i>	Unknown
Birds	<a href="#">Eastern Bluebird</a>	<i>Sialia sialis</i>	Unknown
Birds	<a href="#">Eastern Kingbird</a>	<i>Tyrannus tyrannus</i>	Fairly Common
Birds	<a href="#">Eastern Phoebe</a>	<i>Sayornis phoebe</i>	Unknown
Birds	<a href="#">Eastern Screech-Owl</a>	<i>Otus asio</i>	Uncommon
Birds	<a href="#">European Starling</a>	<i>Sturnus vulgaris</i>	Abundant
Birds	<a href="#">Evening Grosbeak</a>	<i>Coccothraustes vespertinus</i>	Fairly Common
Birds	<a href="#">Ferruginous Hawk</a>	<i>Buteo regalis</i>	Unknown
Birds	<a href="#">Field Sparrow</a>	<i>Spizella pusilla</i>	Unknown
Birds	<a href="#">Forster's Tern</a>	<i>Sterna forsteri</i>	Unknown
Birds	<a href="#">Franklin's Gull</a>	<i>Larus pipixcan</i>	Unknown
Birds	<a href="#">Gadwall</a>	<i>Anas strepera</i>	Rare
Birds	<a href="#">Glaucous Gull</a>	<i>Larus hyperboreus</i>	Unknown
Birds	<a href="#">Golden Eagle</a>	<i>Aquila chrysaetos</i>	Uncommon
Birds	<a href="#">Golden-crowned Kinglet</a>	<i>Regulus satrapa</i>	Uncommon
Birds	<a href="#">Grasshopper Sparrow</a>	<i>Ammodramus savannarum</i>	Uncommon
Birds	<a href="#">Gray Catbird</a>	<i>Dumetella carolinensis</i>	Uncommon
Birds	<a href="#">Great Blue Heron</a>	<i>Ardea herodias</i>	Common
Birds	<a href="#">Great Crested Flycatcher</a>	<i>Myiarchus crinitus</i>	Unknown

Group	Common Name	Scientific Name	Abundance
Birds	<a href="#">Great Egret</a>	<i>Ardea alba</i>	Unknown
Birds	<a href="#">Great Horned Owl</a>	<i>Bubo virginianus</i>	Fairly Common
Birds	<a href="#">Greater Sandhill Crane</a>	<i>Grus canadensis tabida</i>	Unknown
Birds	<a href="#">Greater Scaup</a>	<i>Aythya marila</i>	Unknown
Birds	<a href="#">Greater White-fronted Goose</a>	<i>Anser albifrons</i>	Unknown
Birds	<a href="#">Greater Yellowlegs</a>	<i>Tringa melanoleuca</i>	Unknown
Birds	<a href="#">Great-tailed Grackle</a>	<i>Quiscalus mexicanus</i>	Unknown
Birds	<a href="#">Green Heron</a>	<i>Butorides virescens</i>	Unknown
Birds	<a href="#">Green-tailed Towhee</a>	<i>Pipilo chlorurus</i>	Common
Birds	<a href="#">Green-winged Teal</a>	<i>Anas crecca</i>	Uncommon
Birds	<a href="#">Hairy Woodpecker</a>	<i>Picoides villosus</i>	Uncommon
Birds	<a href="#">Hammond's Flycatcher</a>	<i>Empidonax hammondi</i>	Fairly Common
Birds	<a href="#">Hermit Thrush</a>	<i>Catharus guttatus</i>	Common
Birds	<a href="#">Herring Gull</a>	<i>Larus argentatus</i>	Unknown
Birds	<a href="#">Hooded Merganser</a>	<i>Lophodytes cucullatus</i>	Unknown
Birds	<a href="#">Horned Grebe</a>	<i>Podiceps auritus</i>	No Occurrence
Birds	<a href="#">Horned Lark</a>	<i>Eremophila alpestris</i>	Common
Birds	<a href="#">House Finch</a>	<i>Carpodacus mexicanus</i>	Abundant
Birds	<a href="#">House Sparrow</a>	<i>Passer domesticus</i>	Fairly Common
Birds	<a href="#">House Wren</a>	<i>Troglodytes aedon</i>	Common
Birds	<a href="#">Indigo Bunting</a>	<i>Passerina cyanea</i>	Uncommon
Birds	<a href="#">Killdeer</a>	<i>Charadrius vociferus</i>	Common
Birds	<a href="#">Lapland Longspur</a>	<i>Calcarius lapponicus</i>	Unknown
Birds	<a href="#">Lark Bunting</a>	<i>Calamospiza melanocorys</i>	Uncommon
Birds	<a href="#">Lark Sparrow</a>	<i>Chondestes grammacus</i>	Fairly Common
Birds	<a href="#">Lazuli Bunting</a>	<i>Passerina amoena</i>	Fairly Common
Birds	<a href="#">Least Bittern</a>	<i>Ixobrychus exilis</i>	Casual/Accidental
Birds	<a href="#">Least Sandpiper</a>	<i>Calidris minutilla</i>	Unknown
Birds	<a href="#">Least Tern</a>	<i>Sterna antillarum</i>	Unknown
Birds	<a href="#">Lesser Goldfinch</a>	<i>Carduelis psaltria</i>	Fairly Common
Birds	<a href="#">Lesser Scaup</a>	<i>Aythya affinis</i>	Unknown
Birds	<a href="#">Lesser Yellowlegs</a>	<i>Tringa flavipes</i>	Unknown
Birds	<a href="#">Lewis' Woodpecker</a>	<i>Melanerpes lewis</i>	Uncommon
Birds	<a href="#">Lincoln's Sparrow</a>	<i>Melospiza lincolnii</i>	Common
Birds	<a href="#">Little Blue Heron</a>	<i>Egretta caerulea</i>	Unknown

Group	Common Name	Scientific Name	Abundance
Birds	<a href="#">Loggerhead Shrike</a>	<i>Lanius ludovicianus</i>	Rare
Birds	<a href="#">Long-billed Curlew</a>	<i>Numenius americanus</i>	Unknown
Birds	<a href="#">Long-billed Dowitcher</a>	<i>Limnodromus scolopaceus</i>	Unknown
Birds	<a href="#">Long-eared Owl</a>	<i>Asio otus</i>	Rare
Birds	<a href="#">MacGillivray's Warbler</a>	<i>Oporornis tolmiei</i>	Uncommon
Birds	<a href="#">Mallard</a>	<i>Anas platyrhynchos</i>	Abundant
Birds	<a href="#">Marbled Godwit</a>	<i>Limosa fedoa</i>	Unknown
Birds	<a href="#">Marsh Wren</a>	<i>Cistothorus palustris</i>	Common
Birds	<a href="#">McCown's Longspur</a>	<i>Calcarius mccownii</i>	Unknown
Birds	<a href="#">Merlin</a>	<i>Falco columbarius</i>	Unknown
Birds	<a href="#">Mountain Bluebird</a>	<i>Sialia currucoides</i>	Common
Birds	<a href="#">Mountain Chickadee</a>	<i>Poecile gambeli</i>	Common
Birds	<a href="#">Mountain Plover</a>	<i>Charadrius montanus</i>	Unknown
Birds	<a href="#">Mourning Dove</a>	<i>Zenaida macroura</i>	Abundant
Birds	<a href="#">Nashville Warbler</a>	<i>Vermivora ruficapilla</i>	Unknown
Birds	<a href="#">Northern Bobwhite</a>	<i>Colinus virginianus</i>	Rare
Birds	<a href="#">Northern Cardinal</a>	<i>Cardinalis cardinalis</i>	Unknown
Birds	<a href="#">Northern Flicker</a>	<i>Colaptes auratus</i>	Fairly Common
Birds	<a href="#">Northern Harrier</a>	<i>Circus cyaneus</i>	Rare
Birds	<a href="#">Northern Mockingbird</a>	<i>Mimus polyglottos</i>	Rare
Birds	<a href="#">Northern Pintail</a>	<i>Anas acuta</i>	Unknown
Birds	<a href="#">Northern Pygmy-Owl</a>	<i>Glaucidium gnoma</i>	Uncommon
Birds	<a href="#">Northern Rough-winged Swallow</a>	<i>Stelgidopteryx serripennis</i>	Fairly Common
Birds	<a href="#">Northern Saw-whet Owl</a>	<i>Aegolius acadicus</i>	Uncommon
Birds	<a href="#">Northern Shoveler</a>	<i>Anas clypeata</i>	Rare
Birds	<a href="#">Northern Shrike</a>	<i>Lanius excubitor</i>	Unknown
Birds	<a href="#">Northern Waterthrush</a>	<i>Seiurus noveboracensis</i>	Unknown
Birds	<a href="#">Oldsquaw</a>	<i>Clangula hyemalis</i>	Unknown
Birds	<a href="#">Olive-sided Flycatcher</a>	<i>Contopus cooperi</i>	Uncommon
Birds	<a href="#">Orange-crowned Warbler</a>	<i>Vermivora celata</i>	Rare
Birds	<a href="#">Orchard Oriole</a>	<i>Icterus spurius</i>	Unknown
Birds	<a href="#">Ovenbird</a>	<i>Seiurus aurocapillus</i>	Very Rare
Birds	<a href="#">Pacific Loon</a>	<i>Gavia pacifica</i>	No Occurrence
Birds	<a href="#">Palm Warbler</a>	<i>Dendroica palmarum</i>	Unknown
Birds	<a href="#">Pectoral Sandpiper</a>	<i>Calidris melanotos</i>	Unknown

Group	Common Name	Scientific Name	Abundance
Birds	<a href="#">Peregrine Falcon</a>	<i>Falco peregrinus</i>	Unknown
Birds	<a href="#">Pied-billed Grebe</a>	<i>Podilymbus podiceps</i>	Fairly Common
Birds	<a href="#">Pine Grosbeak</a>	<i>Pinicola enucleator</i>	Fairly Common
Birds	<a href="#">Pine Siskin</a>	<i>Carduelis pinus</i>	Common
Birds	<a href="#">Piping Plover</a>	<i>Charadrius melodus</i>	Unknown
Birds	<a href="#">Plumbeous Vireo</a>	<i>Vireo plumbeus</i>	Fairly Common
Birds	<a href="#">Prairie Falcon</a>	<i>Falco mexicanus</i>	Rare
Birds	<a href="#">Purple Finch</a>	<i>Carpodacus purpureus</i>	Unknown
Birds	<a href="#">Red-breasted Merganser</a>	<i>Mergus serrator</i>	Unknown
Birds	<a href="#">Red-eyed Vireo</a>	<i>Vireo olivaceus</i>	Rare
Birds	<a href="#">Redhead</a>	<i>Aythya americana</i>	Rare
Birds	<a href="#">Red-headed Woodpecker</a>	<i>Melanerpes erythrocephalus</i>	Uncommon
Birds	<a href="#">Red-necked Phalarope</a>	<i>Phalaropus lobatus</i>	Unknown
Birds	<a href="#">Red-tailed Hawk</a>	<i>Buteo jamaicensis</i>	Fairly Common
Birds	<a href="#">Red-winged Blackbird</a>	<i>Agelaius phoeniceus</i>	Abundant
Birds	<a href="#">Ring-billed Gull</a>	<i>Larus delawarensis</i>	Unknown
Birds	<a href="#">Ring-necked Duck</a>	<i>Aythya collaris</i>	Uncommon
Birds	<a href="#">Ring-necked Pheasant</a>	<i>Phasianus colchicus</i>	Fairly Common
Birds	<a href="#">Rock Dove</a>	<i>Columba livia</i>	Abundant
Birds	<a href="#">Rock Wren</a>	<i>Salpinctes obsoletus</i>	Fairly Common
Birds	<a href="#">Rose-breasted Grosbeak</a>	<i>Pheucticus ludovicianus</i>	Casual/Accidental
Birds	<a href="#">Ross' Goose</a>	<i>Chen rossii</i>	Unknown
Birds	<a href="#">Rough-legged Hawk</a>	<i>Buteo lagopus</i>	Unknown
Birds	<a href="#">Ruby-crowned Kinglet</a>	<i>Regulus calendula</i>	Common
Birds	<a href="#">Ruddy Duck</a>	<i>Oxyura jamaicensis</i>	Rare
Birds	<a href="#">Rufous Hummingbird</a>	<i>Selasphorus rufus</i>	Unknown
Birds	<a href="#">Rufous-crowned Sparrow</a>	<i>Aimophila ruficeps</i>	Unknown
Birds	<a href="#">Sabine's Gull</a>	<i>Xema sabini</i>	Unknown
Birds	<a href="#">Sanderling</a>	<i>Calidris alba</i>	Unknown
Birds	<a href="#">Savannah Sparrow</a>	<i>Passerculus sandwichensis</i>	Fairly Common
Birds	<a href="#">Say's Phoebe</a>	<i>Sayornis saya</i>	Uncommon
Birds	<a href="#">Scissor-tailed Flycatcher</a>	<i>Tyrannus forficatus</i>	Unknown
Birds	<a href="#">Scott's Oriole</a>	<i>Icterus parisorum</i>	Unknown
Birds	<a href="#">Semipalmated Plover</a>	<i>Charadrius semipalmatus</i>	Unknown
Birds	<a href="#">Semipalmated Sandpiper</a>	<i>Calidris pusilla</i>	Unknown

Group	Common Name	Scientific Name	Abundance
Birds	<a href="#">Sharp-shinned Hawk</a>	<i>Accipiter striatus</i>	Uncommon
Birds	<a href="#">Short-eared Owl</a>	<i>Asio flammeus</i>	Rare
Birds	<a href="#">Snow Bunting</a>	<i>Plectrophenax nivalis</i>	Unknown
Birds	<a href="#">Snow Goose</a>	<i>Chen caerulescens</i>	Unknown
Birds	<a href="#">Snowy Egret</a>	<i>Egretta thula</i>	Unknown
Birds	<a href="#">Snowy Plover</a>	<i>Charadrius alexandrinus</i>	Unknown
Birds	<a href="#">Solitary Sandpiper</a>	<i>Tringa solitaria</i>	Unknown
Birds	<a href="#">Song Sparrow</a>	<i>Melospiza melodia</i>	Fairly Common
Birds	<a href="#">Sora</a>	<i>Porzana carolina</i>	Uncommon
Birds	<a href="#">Spotted Sandpiper</a>	<i>Actitis macularia</i>	Fairly Common
Birds	<a href="#">Spotted Towhee</a>	<i>Pipilo maculatus</i>	Fairly Common
Birds	<a href="#">Stilt Sandpiper</a>	<i>Calidris himantopus</i>	Unknown
Birds	<a href="#">Surf Scoter</a>	<i>Melanitta perspicillata</i>	Unknown
Birds	<a href="#">Swainson's Hawk</a>	<i>Buteo swainsoni</i>	Fairly Common
Birds	<a href="#">Swainson's Thrush</a>	<i>Catharus ustulatus</i>	Fairly Common
Birds	<a href="#">Swamp Sparrow</a>	<i>Melospiza georgiana</i>	Unknown
Birds	<a href="#">Tennessee Warbler</a>	<i>Vermivora peregrina</i>	Unknown
Birds	<a href="#">Townsend's Solitaire</a>	<i>Myadestes townsendi</i>	Fairly Common
Birds	<a href="#">Townsend's Warbler</a>	<i>Dendroica townsendi</i>	Unknown
Birds	<a href="#">Tree Swallow</a>	<i>Tachycineta bicolor</i>	Fairly Common
Birds	<a href="#">Tundra Swan</a>	<i>Cygnus columbianus</i>	Unknown
Birds	<a href="#">Turkey Vulture</a>	<i>Cathartes aura</i>	Uncommon
Birds	<a href="#">Varied Thrush</a>	<i>Ixoreus naevius</i>	Unknown
Birds	<a href="#">Veery</a>	<i>Catharus fuscescens</i>	Unknown
Birds	<a href="#">Vermilion Flycatcher</a>	<i>Pyrocephalus rubinus</i>	Unknown
Birds	<a href="#">Vesper Sparrow</a>	<i>Pooecetes gramineus</i>	Common
Birds	<a href="#">Violet-green Swallow</a>	<i>Tachycineta thalassina</i>	Common
Birds	<a href="#">Virginia Rail</a>	<i>Rallus limicola</i>	Uncommon
Birds	<a href="#">Virginia's Warbler</a>	<i>Vermivora virginiae</i>	Fairly Common
Birds	<a href="#">Warbling Vireo</a>	<i>Vireo gilvus</i>	Common
Birds	<a href="#">Western Bluebird</a>	<i>Sialia mexicana</i>	Uncommon
Birds	<a href="#">Western Burrowing Owl</a>	<i>Athene cunicularia</i>	Rare
Birds	<a href="#">Western Grebe</a>	<i>Aechmophorus occidentalis</i>	Unknown
Birds	<a href="#">Western Kingbird</a>	<i>Tyrannus verticalis</i>	Common
Birds	<a href="#">Western Meadowlark</a>	<i>Sturnella neglecta</i>	Common

Group	Common Name	Scientific Name	Abundance
Birds	<a href="#">Western Sandpiper</a>	<i>Calidris mauri</i>	Unknown
Birds	<a href="#">Western Screech-Owl</a>	<i>Otus kennicottii</i>	Unknown
Birds	<a href="#">Western Tanager</a>	<i>Piranga ludoviciana</i>	Fairly Common
Birds	<a href="#">Western Wood-Pewee</a>	<i>Contopus sordidulus</i>	Common
Birds	<a href="#">Whimbrel</a>	<i>Numenius phaeopus</i>	Unknown
Birds	<a href="#">White-breasted Nuthatch</a>	<i>Sitta carolinensis</i>	Fairly Common
Birds	<a href="#">White-crowned Sparrow</a>	<i>Zonotrichia leucophrys</i>	Common
Birds	<a href="#">White-faced Ibis</a>	<i>Plegadis chihi</i>	Unknown
Birds	<a href="#">White-throated Sparrow</a>	<i>Zonotrichia albicollis</i>	Unknown
Birds	<a href="#">White-winged Crossbill</a>	<i>Loxia leucoptera</i>	Casual/Accidental
Birds	<a href="#">White-winged Scoter</a>	<i>Melanitta fusca</i>	Unknown
Birds	<a href="#">Willet</a>	<i>Catoptrophorus semipalmatus</i>	Unknown
Birds	<a href="#">Willow Flycatcher</a>	<i>Empidonax traillii</i>	Uncommon
Birds	<a href="#">Wilson's Phalarope</a>	<i>Phalaropus tricolor</i>	Uncommon
Birds	<a href="#">Wilson's Warbler</a>	<i>Wilsonia pusilla</i>	Fairly Common
Birds	<a href="#">Winter Wren</a>	<i>Troglodytes troglodytes</i>	Unknown
Birds	<a href="#">Wood Duck</a>	<i>Aix sponsa</i>	Uncommon
Birds	<a href="#">Wood Thrush</a>	<i>Hylocichla mustelina</i>	Unknown
Birds	<a href="#">Yellow Warbler</a>	<i>Dendroica petechia</i>	Fairly Common
Birds	<a href="#">Yellow-billed Cuckoo</a>	<i>Coccyzus americanus</i>	Uncommon
Birds	<a href="#">Yellow-breasted Chat</a>	<i>Icteria virens</i>	Fairly Common
Birds	<a href="#">Yellow-crowned Night-Heron</a>	<i>Nyctanassa violacea</i>	Unknown
Birds	<a href="#">Yellow-headed Blackbird</a>	<i>Xanthocephalus xanthocephalus</i>	Abundant
Birds	<a href="#">Yellow-rumped Warbler</a>	<i>Dendroica coronata</i>	Common
Mammals	<a href="#">American Badger</a>	<i>Taxidea taxus</i>	Common
Mammals	<a href="#">American Beaver</a>	<i>Castor canadensis</i>	Fairly Common
Mammals	<a href="#">American Elk</a>	<i>Cervus elaphus</i>	Common
Mammals	<a href="#">Big Brown Bat</a>	<i>Eptesicus fuscus</i>	Abundant
Mammals	<a href="#">Black Bear</a>	<i>Ursus americanus</i>	Abundant
Mammals	<a href="#">Black-tailed Jackrabbit</a>	<i>Lepus californicus</i>	Fairly Common
Mammals	<a href="#">Black-tailed Prairie Dog</a>	<i>Cynomys ludovicianus</i>	Fairly Common
Mammals	<a href="#">Bobcat</a>	<i>Lynx rufus</i>	Fairly Common
Mammals	<a href="#">Bushy-tailed Woodrat</a>	<i>Neotoma cinerea</i>	Fairly Common
Mammals	<a href="#">Common Muskrat</a>	<i>Ondatra zibethicus</i>	Common
Mammals	<a href="#">Common Porcupine</a>	<i>Erethizon dorsatum</i>	Uncommon

Group	Common Name	Scientific Name	Abundance
Mammals	<a href="#">Coyote</a>	<i>Canis latrans</i>	Abundant
Mammals	<a href="#">Deer Mouse</a>	<i>Peromyscus maniculatus</i>	Abundant
Mammals	<a href="#">Desert Cottontail</a>	<i>Sylvilagus audubonii</i>	Fairly Common
Mammals	<a href="#">Eastern Cottontail</a>	<i>Sylvilagus floridanus</i>	Uncommon
Mammals	<a href="#">Ermine</a>	<i>Mustela erminea</i>	Fairly Common
Mammals	<a href="#">Fox Squirrel</a>	<i>Sciurus niger</i>	Common
Mammals	<a href="#">Fringed Myotis</a>	<i>Myotis thysanodes</i>	Rare
Mammals	<a href="#">Golden-mantled Ground Squirrel</a>	<i>Spermophilus lateralis</i>	Fairly Common
Mammals	<a href="#">Gray Fox</a>	<i>Urocyon cinereoargenteus</i>	Uncommon
Mammals	<a href="#">Hispid Pocket Mouse</a>	<i>Chaetodipus hispidus</i>	Fairly Common
Mammals	<a href="#">Hoary Bat</a>	<i>Lasiurus cinereus</i>	Common
Mammals	<a href="#">House Mouse</a>	<i>Mus musculus</i>	Abundant
Mammals	<a href="#">Least Shrew</a>	<i>Cryptotis parva</i>	Uncommon
Mammals	<a href="#">Little Brown Myotis</a>	<i>Myotis lucifugus</i>	Abundant
Mammals	<a href="#">Long-eared Myotis</a>	<i>Myotis evotis</i>	Fairly Common
Mammals	<a href="#">Long-legged Myotis</a>	<i>Myotis volans</i>	Common
Mammals	<a href="#">Long-tailed Vole</a>	<i>Microtus longicaudus</i>	Fairly Common
Mammals	<a href="#">Long-tailed Weasel</a>	<i>Mustela frenata</i>	Fairly Common
Mammals	<a href="#">Masked Shrew</a>	<i>Sorex cinereus</i>	Fairly Common
Mammals	<a href="#">Meadow Vole</a>	<i>Microtus pennsylvanicus</i>	Common
Mammals	<a href="#">Merriam's Shrew</a>	<i>Sorex merriami</i>	Very Rare
Mammals	<a href="#">Mink</a>	<i>Mustela vison</i>	Rare
Mammals	<a href="#">Mountain Lion</a>	<i>Felis concolor</i>	Common
Mammals	<a href="#">Mule Deer</a>	<i>Odocoileus hemionus</i>	Abundant
Mammals	<a href="#">Northern Grasshopper Mouse</a>	<i>Onychomys leucogaster</i>	Fairly Common
Mammals	<a href="#">Northern Pocket Gopher</a>	<i>Thomomys talpoides</i>	Common
Mammals	<a href="#">Plains Harvest Mouse</a>	<i>Reithrodontomys montanus</i>	Unknown
Mammals	<a href="#">Plains Pocket Gopher</a>	<i>Geomys bursarius</i>	Fairly Common
Mammals	<a href="#">Plains Pocket Mouse</a>	<i>Perognathus flavescens</i>	Fairly Common
Mammals	<a href="#">Prairie Vole</a>	<i>Microtus ochrogaster</i>	Common
Mammals	<a href="#">Preble's Meadow Jumping Mouse</a>	<i>Zapus hudsonius preblei</i>	Uncommon
Mammals	<a href="#">Raccoon</a>	<i>Procyon lotor</i>	Abundant
Mammals	<a href="#">Red Bat</a>	<i>Lasiurus borealis</i>	Rare
Mammals	<a href="#">Red Fox</a>	<i>Vulpes vulpes</i>	Abundant
Mammals	<a href="#">Rock Squirrel</a>	<i>Spermophilus variegatus</i>	Fairly Common

Group	Common Name	Scientific Name	Abundance
Mammals	<a href="#">Silver-haired Bat</a>	<i>Lasionycteris noctivagans</i>	Common
Mammals	<a href="#">Spotted Ground Squirrel</a>	<i>Spermophilus spilosoma</i>	Uncommon
Mammals	<a href="#">Striped Skunk</a>	<i>Mephitis mephitis</i>	Abundant
Mammals	<a href="#">Swift Fox</a>	<i>Vulpes velox</i>	Casual/Accidental
Mammals	<a href="#">Thirteen-lined Ground Squirrel</a>	<i>Spermophilus tridecemlineatus</i>	Common
Mammals	<a href="#">Virginia Opossum</a>	<i>Didelphis virginiana</i>	Casual/Accidental
Mammals	<a href="#">Water Shrew</a>	<i>Sorex palustris</i>	Uncommon
Mammals	<a href="#">Western Small-footed Myotis</a>	<i>Myotis ciliolabrum</i>	Common
Mammals	<a href="#">Western Spotted Skunk</a>	<i>Spilogale gracilis</i>	Uncommon
Mammals	<a href="#">White-tailed Deer</a>	<i>Odocoileus virginianus</i>	Common
Mammals	<a href="#">White-tailed Jackrabbit</a>	<i>Lepus townsendii</i>	Abundant
Reptiles	<a href="#">Common Garter Snake</a>	<i>Thamnophis sirtalis</i>	Sparsely Common
Reptiles	<a href="#">Fence Lizard</a>	<i>Sceloporus undulatus</i>	Common
Reptiles	<a href="#">Gopher Snake</a>	<i>Pituophis catenifer</i>	Sparsely Common
Reptiles	<a href="#">Lined Snake</a>	<i>Tropidoclonion lineatum</i>	Rare
Reptiles	<a href="#">Many-lined Skink</a>	<i>Eumeces multivirgatus</i>	Unknown
Reptiles	<a href="#">Milk Snake</a>	<i>Lampropeltis triangulum</i>	Rare
Reptiles	<a href="#">Northern Water Snake</a>	<i>Nerodia sipedon</i>	Uncommon
Reptiles	<a href="#">Ornate Box Turtle</a>	<i>Terrapene ornata</i>	Unknown
Reptiles	<a href="#">Painted Turtle</a>	<i>Chrysemys picta</i>	Common
Reptiles	<a href="#">Plains Black-headed Snake</a>	<i>Tantilla nigriceps</i>	Rare
Reptiles	<a href="#">Plains Garter Snake</a>	<i>Thamnophis radix</i>	Fairly Common
Reptiles	<a href="#">Racer</a>	<i>Coluber constrictor</i>	Sparsely Common
Reptiles	<a href="#">Short-horned Lizard</a>	<i>Phrynosoma hernandesi</i>	Uncommon
Reptiles	<a href="#">Six-lined Racerunner</a>	<i>Cnemidophorus sexlineatus</i>	Locally Common
Reptiles	<a href="#">Smooth Green Snake</a>	<i>Liochlorophis vernalis</i>	Rare
Reptiles	<a href="#">Snapping Turtle</a>	<i>Chelydra serpentina</i>	Fairly Common
Reptiles	<a href="#">Spiny Softshell</a>	<i>Apalone spinifera</i>	Rare
Reptiles	<a href="#">Western Hognose Snake</a>	<i>Heterodon nasicus</i>	Unknown
Reptiles	<a href="#">Western Rattlesnake</a>	<i>Crotalus viridis</i>	Uncommon
Reptiles	<a href="#">Western Terrestrial Garter Snake</a>	<i>Thamnophis elegans</i>	Fairly Common

Sources: CPW 2012; Fitzgerald et al. 1994; Andrews and Righter 1992; Hammerson 1999.